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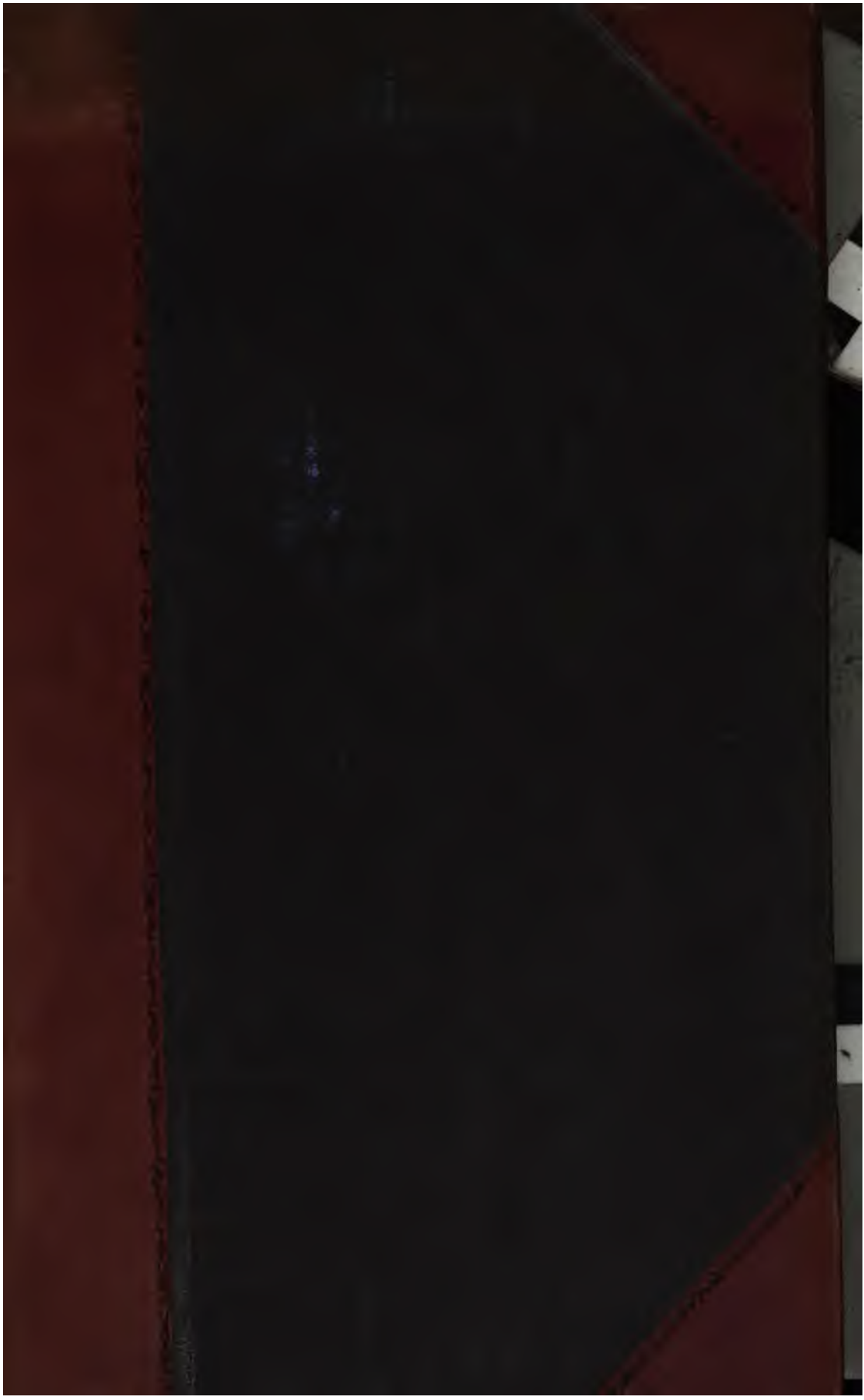

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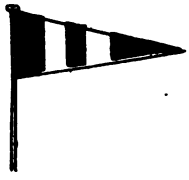
"CODE SIGNAL" AND  "ANSWERING PENNANT

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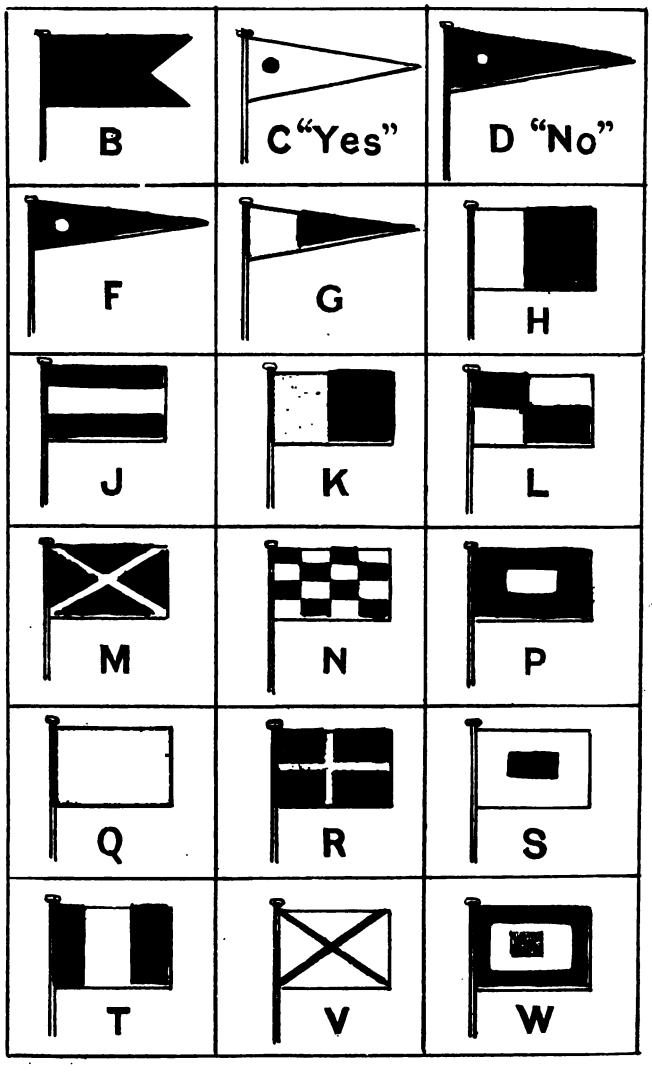

SEAMANSHIP.

BY

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MASTER IN THE MERCANTILE MARINE.

AUTHOR OF BERGEN'S "NAVIGATION," BERGEN'S "MARINE ENGINEER," ETC.

PRICE TWO SHILLINGS AND SIXPENCE.

FIFTH EDITION.

(Entered at Stationers' Hall.)

NORTH SHIELDS:

PRINTED AND PUBLISHED BY W. J. POTTS & CO., ATLAS WORKS.

LONDON: SIMPKIN, MARSHALL & CO., STATIONERS' HALL COURT.

GLASGOW: D. McGREGOR & Co., CLYDE PLACE, ALSO SOUTH CASTLE STREET, LIVERPOOL.

LIVERPOOL: PHILIP, SON & NEPHEW, SOUTH CASTLE STREET.

SUNDERLAND; WM. C. BERGEN, LAWRENCE STREET.

1880.

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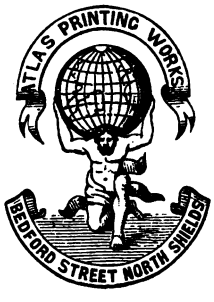

ATLAS PRINTING WORKS
BEDFORD STREET NORTH SHIELDS

PREFACE.

The following work is derived principally from the author's treatise on Navigation. It is here put in the form of question and answer. There are some additional subjects treated, which it is hoped will increase the utility of the work.

It is difficult, without repetition, to keep the Seamanship for the several grades distinct. The author has therefore thought it best to treat every subject completely, and the following Rules will enable the candidate to select the part he wants. Or his teacher will point it out to him.

QUALIFICATIONS FOR CERTIFICATES OF COMPETENCY FOR A "FOREIGN-GOING SHIP."

The qualifications in Seamanship required for the several ranks undermentioned are as follow :—

A SECOND MATE must be seventeen years of age, and must have been four years at sea.

In Seamanship.—He must give satisfactory answers as to the rigging and unrigging of ships, stowing of holds, &c.; must understand the measurement of the log line, glass, and lead-line; be conversant with the rule of the road, as regards both steamers and sailing vessels, and the lights and fog signals carried by them, and will also be examined as to his acquaintance with "the Commercial Code of Signals for the use of all Nations."

An ONLY MATE must be nineteen years of age, and have been five years at sea.

In Seamanship.—In addition to what is required for a Second Mate, he must know how to moor and unmoor, and to keep a clear anchor; to carry out an anchor; to stow a hold; and to make the requisite entries in the ship's log. He will also be questioned as to his knowledge of the use and management of the mortar and rocket lines in the case of the stranding of a vessel, as explained in the official log book.

A FIRST MATE must be nineteen years of age, and have served five years at sea, of which one year must have been as either Second or Only Mate, or as both.

In Seamanship.—In addition to the qualifications required for an Only Mate, a more extensive knowledge of seamanship will be required, as to shifting large spars and sails, managing a ship in stormy weather, taking in and making sail, shifting yards and masts, &c., and getting heavy weights, anchor, &c., in and out; casting a ship on a lee shore; and securing the masts in the event of accident to the bowsprit.

A MASTER must be twenty-one years of age, and have been either six years at sea, of which one year must have been First or Only Mate, and one year as Second Mate, or he must have been six-and-a-half years at sea, of which two-and-a-half years must have been as second Mate, during the last twelve months of which he must be in possession of a First Mate's Certificate.

He will be examined as to his competency to construct jury rudders and rafts; and as to his resources for the preservation of the ship's crew in the event of wreck. He must possess a sufficient knowledge of what he is required to do by law, as to entry and discharge, and the management of his crew, and as to penalties and entries to be made in the official log; and a knowledge of the measures for preventing and checking the outbreak of scurvy on board ship. He will be questioned as to his knowledge of invoices, charter party, Lloyd's agent, and as to the nature of bottomry, and he must be acquainted with the leading lights of the channel he has been accustomed to navigate, or which he is going to use.

In cases where an applicant for a certificate as Master Ordinary has only served in a fore-and-aft-rigged vessel, and is ignorant of the management of a square-rigged vessel, he may obtain a certificate on which the words "*fore-and-aft-rigged vessel*" will be written. This certificate does not entitle him to command a square-rigged ship. This is not, however, to apply to Mates, who, being younger men, are expected for the future to learn their business completely.

An EXTRA MASTER'S EXAMINATION is voluntary, and intended for such persons as wish to prove their superior qualifications, and are desirous of having certificates for the highest grade granted by the Board of Trade.

In Seamanship.—The extra examination will consist of an inquiry into the competency of the applicant to heave a ship down, in case of accident befalling her abroad; to get lower masts in and out; and to perform such operations of a like nature as the Examiner may consider it proper to examine him upon.

Notes.—The certificates of character given by masters of ships must testify to the *sobriety* of the candidate, and he must have one from his *last* master.

All candidates must produce proof of at least *one year's servitude* in a square rigged ship in any capacity. The ships and their official numbers must be shewn in the form in the column of Remarks.

The candidates must sign their names at the foot of every page of their Examination Papers. They must also put down their Rotation Number in its place.

Time of servitude in the coasting trade must be verified by the Register General of Seamen.

SEA CARPENTERS, COOKS, and STEWARDS, who have not been on the articles as seamen, must produce good references from Captains whom they have served, certifying that they are competent seamen.

Men who have only served on board of steamers are eligible to pass for *fore-and-aft certificate*.

In all such cases, all documents must be sent to the Assistant Secretary, Marine Department, Board of Trade, Whitehall, London, and the permission of the Board of Trade asked.

SEAMANSHIP.

FOR SECOND MATE.

CUTTING RIGGING.

Question or Command. How do you cut rigging correctly ?

Answer. Draw a plan, and cut by the plan.

FITTING RIGGING.

LOWER RIGGING.

Q. What is done with the Shroud rope before cutting it ?

A. Stretch the Shroud rope about an inch to the foot, that is about one-twelfth, before cutting it. It is better to let it remain on the stretch for a day or two before cutting it.

Q. What is done with the standing Rigging ?

A. Standing Rigging is wormed, parcelled and served, wherever there will be any chafe on it ; but no more service should be put on than will prevent chafe, as it is better for it to be exposed to the air. The rigging should be wormed before it is stretched.

Q. Which shrouds are most liable to chafe ?

A. The foremost shrouds of the lower rigging are liable to chafe from the tacks, sheets, and other gear of the courses, and from the lower yards when braced up, and they are therefore served the whole way, and in addition, chafe battens and mats are put on where there is much chafe.

Q. How many parts are the other shrouds divided into ?

A. The other pairs of shrouds are divided into three parts, and the middle part is served, and, in addition, mats and rounding are put on where the lower yards would chafe the rigging when the yards are braced up.

Q. How is rope parcelled ?

A. In parcelling, tar the rope well, begin at the bottom, and parcel with the lay of the rope upwards to the middle mark of each pair of shrouds.

The edges of the parcelling thus overlap each other in such a manner,

that if any water get under the service, it is prevented from getting to the rope.

Serve as taut as possible against the lay of the rope, beginning at the middle mark.

Q. What is the size of the eyes of the rigging ?

A. The eye of the starboard first pairs of shrouds is made about once and a quarter times the circumference of the mast head. Each of the others is in succession made the breadth of a seizing larger than the one that precedes it.

Q. How is the dead eye turned in ?

A. Tar and parcel the score of the dead eye, and turn the rope in with the sun if it be right-handed rope, but against the sun if it be left-handed rope ; pass the throat seizing with nine or ten turns, and as the outer turns are most stretched when the quarter seizing is passed, they ought not to be passed quite so tight as the inner turns ; pass the quarter seizings half way to the end, and then the end seizings ; tar the end of the shroud, and put the cap on.

If the shroud be right-hand laid rope, the standing part of the shroud will be aft on the starboard side, and forward on the port side ; and the reverse if the rope be hawser laid.

TOPMAST RIGGING.

Q. How is the topmast rigging fit ?

A. The topmast rigging is fit in a similar manner to the lower rigging, it being parcelled and served where it is liable to be chafed. In some cases, it is set up with dead eyes and lanyards ; but in other instances, it is passed through a bull's eye, and set up on its end.

TOPGALLANT RIGGING.

Q. Explain how the topgallant rigging is set up.

A. The topgallant rigging is generally rove through holes in the ends of the crosstrees, and set up with a lanyard to eyebolts in the spider hoop. In some cases it is set up in the top, and in others it is passed through a bull's eye, or thimble, and set up on its end.

STAYS.

Q. How is the fore stay set up ?

A. In some cases the fore stay is double ; the bight is passed under the bowsprit, and it sets up with two eyes and a lanyard abaft the mast. In other instances, it is single, has a collar, and is lashed at the mast head, and the other end is rove through a bull's eye, and is set up on its end ; or a dead-eye is turned in, and it sets up with a lanyard to a heart on the bowsprit.

When stays are double, they ought to be seized together, or they will chafe.

Q. How does the fore topmast set up ?

A. The fore topmast stay is rove through the bee on the bowsprit, and then through a bull's eye at the bow, and sets up on its end. In some cases it sets up with dead eyes and a lanyard.

Q, Explain how the jib stay, fore topgallant stay, and fore royal stay set up.

A. The jib stay, fore topgallant stay, and fore royal stay generally reeve through holes or over sheaves in the jib-boom, and they set up with a gun-tackle purchase; or with lanyards rove through thimbles, or bull's eyes, and eyebolts.

In small ships which have a traveller on their jib-boom, the jib stay comes down alongside of the foremast, and sets up with a double and single block.

Q. How is the main stay set up?

A. The main stay is set up to the hook at the bows, or to a strong bolt at the deck, or to a Sampson-post put in for the purpose.

Q. How is the main topmast stay set up?

A. The main topmast stay reeves through a heart or thimble at the foremast head, or through a hole in the cap, and sets up in the top; in some cases it sets up on the deck.

Q. Where do the other small stays set up, and what kind of rope is now coming into extensive use?

A. The other small fore-and-aft stays set up aloft.
Wire rope is now coming into extensive use for rigging, and answers well, particularly for fore-and-aft stays.

RIGGING LOWER YARDS.

Q. Rig a lower yard?

A. Iron hoops with eye-bolts and thimbles in them for the lifts to splice over, and reef tackle blocks to shackle to, are generally fit on the yards. Short pieces of chain, with big links in one end and thimbles in the other, are used for the foot ropes, the big links are put over the brace block eye-bolts, and the ropes are spliced over the thimbles.

The brace pendants are often chain.

The clue garnet blocks are generally at the middle of the yard, but a better plan is to place them at the yard arms; by doing so, and reeving the buntlines through thimbles half-way down the sail, so that the lower half of them is abaft the sail, when the sail is hauled up in a gale of wind, it is secure and almost furled.

Seize the leachline blocks and beckets on the jackstay. In large ships, blocks are used for the topsail sheets; some ships have iron clamps and sheaves for them; and small vessels have iron sheaves in the yard arms.

RIGGING TOPSAIL YARDS.

Q. Rig a topsail and topgallant yard?

A. Put on the earring strops first; small eye bolts are often used instead of the strops; next put on the foot ropes, Flemish foot ropes, lifts, reef-tackle blocks, and brace blocks; the quarter blocks are either lashed or shackled on.
The topgallant yards and royal yards are fit in a similar manner, with some slight exceptions.

RIGGING SHIP.

RIGGING SHEARS.

Q. Take the mast shears on board a large ship.

A. Take the shears on deck, over the bows, small ends aft, by means of a small derrick rigged forward; or hang skids over the side and par-buckle them in.

Q. Rig the shears?

A. Place the heels fair, and not far apart. Put the small ends as high as convenient, cross, and lash them. Open the heels, and place them on a hard wood plank, with its lower edges chamfered. Place a strong plank under the beams, below the shears, and shores under the plank.

Make luff tackles fast to both foreside and aftside of each shear heel, to secure and transport the shears, haul the after tackle tight and belay it. Lash the upper purchase block over the shear lashing, so that it will hang fair under the cross, and work free, put canvas over the shear lashing to prevent chafe.

Reeve the first part of the main fall through the middle sheave, make the lower purchase block fast forward.

Lash a small purchase block, for a truss tackle, to the after shear head, so that the fall may work clear of the main fall.

Lash a girtline block above the last block. Clove-hitch two stout ropes to the shear heads, so as to have two fore guys, and two after guys, put luff tackles on each of those guys.

Q. How do you raise the shears?

A. With the main purchase.

Q. If there were much difficulty in raising the shears what would you do?

A. Rig a small derrick to raise them until the main fall acts with more power.

TAKING IN THE MIZEN MAST.

Q. Lash the purchase to the mizen mast.

A. Place the mast alongside with its head aft, and foreside upwards. Lash the lower purchase block to the foreside of the mast, between two points measured from the heel of the mast, the lower one is found by measuring the distance from the mast step to the mast combings; the upper one is found by measuring the distance from the bottom of the lower block, when it is block and block, to the rail; be careful to allow for the lashing stretching.

Q. Take in the mast.

A. Let the main tackle plumb the mast hole.

Sling skids over the side, to carry the mast clear of the eye-bolts, channels, &c. Heave away until the mast is nearly at the height of the rail. Make a tackle fast to ease in board. When the mast head is over the rail, put on the trestletrees, top, and cap, make girtlines fast to the

mast head, and the truss tackle fast below the top. Heave away until the mast is high enough, point it down the mast hole, lower away, tar, or white lead, the tenon, step the mast, and wedge it temporarily. Shift the shears.

Step the mainmast and foremast in a similar manner.

NOTE.—If it be a poop deck ship, another pair of shears must be rigged after the mizenmast is in.

TAKING IN THE BOWSPRIT.

Q. Make ready for taking in the bowsprit.

A. Make a strong rope fast to the foremast head, and lead it well aft, to act as a stay. Let the shears slope well foreward. Make the fore guys fast to the foremast head. Lash the lower purchase block to the upper side of the bowsprit, outside of the distance from the heel to the knight heads, make the truss tackle and also guys fast to the outer end of the bowsprit, make guys fast to the heel, put on the cap.

Q. Take in the bowsprit.

A. Heave on the purchase.

When the bowsprit is well topped up by the truss tackle, if the shears cannot be sufficiently sloped to point the heel, rig a small spar, as a jib-boom over the forecastle, lash its inner end, fix a tackle at the outer end to haul the bowsprit out, and point it in.

Small ships have no topgallant forecastle, and hence their bowsprits are taken in without any difficulty.

SECURING THE BOWSPRIT.

Q. Secure the bowsprit.

A. In order to bring the bowsprit down hang a cask of water, or other heavy weight to its end; or send a jib-boom out.

Pass the gammoning and frap it, and set up the bobstay and bowsprit shrouds.

PLACING A TOP OVER A MAST HEAD.

Q. Place a top over a mast head.

A. Lay the top on deck abaft the mast, foreside against the mast, lower part down. Reeve girtlines on each side of the mast head. Pass the end of each under the fore part of the top, and make the ends fast to the after crosstrees, place a few stops between the fore part and after part of the top. Make guys fast to both foreside and afterside of the top. Sway away. When the top is high enough, cast off the upper stops. Sway away again. Cast off the other stops. Steady the top by the guys, and let it fall over the mast head.

PLACING THE LOWER RIGGING OVER THE MAST HEAD.

Q. Place the lower rigging over the mast head.

A. Tar the mast head in the way of the rigging, tar and parcel the bolsters, and place them. If the shrouds be an odd number. Bend the girtline on to the starboard fore swifter. If they be an even number. Bend on the starboard first pair of shrouds, below the seizing, so that the shrouds may go over the mast head, stop the girtline to the eye of

the shrouds, and sway away. When the eye is up to the girtline block, cast off the stop, sway away and place the shrouds over the mast head. Be careful to have them fair, and forced well down on the bolsters.

Proceed, in like manner, with the first pair of shrouds on the port side, then with the second pair on the starboard side; and so on.

Next, place the lower stay over the mast head.

REEVING THE LANYARDS OF THE LOWER RIGGING.

Q. Reeve the lanyards of the lower rigging.

A. Reeve them so that the knots come under the end part of the shroud. Some ships have four holes in the lower dead eye and three in the upper one, and they set up on both ends of the lanyard.

SETTING UP THE LOWER RIGGING.

Q. Set up the lower rigging.

A. Take in the slack of the rigging, stay the mast; then set the rigging up. Begin with the starboard first pair of shrouds, then the port first pair; and so on.

GETTING A HEAVY CAP ON THE LOWER MAST HEAD.

Q. Get a heavy cap on the lower mast head.

A. Send the cap on to the top with a girtline; place the round hole of the cap over the hole in the trestletree. When the topmast is sent up, lash the cap to it; when the topmast is high enough for the purpose, slue it, and place the cap on the mast head.

SENDING UP A TOPMAST.

Q. Send a topmast up.

A. Place the mast alongside, with its head forward, and afterside up. Hook a top block on to the eye-bolt in the lower cap, reeve a mast rope through this block, make its end fast to the middle of the topmast, and heave the topmast on to the deck, cast off the mast rope. Pass the end of the mast rope down through the hole in the trestletrees, through the sheave hole in the heel of the topmast, reeve the rope from the same side as the top block is on, reeve the end through the sheave hole at the topmast head, make the end fast, and rack the two parts of the mast rope together. Sway away, point the mast through the cap; when it is necessary double the mast rope. Sway away, and fid the mast.

SENDING TOPMAST CROSSTREES UP.

Q. Send the topmast crosstrees up.

A. When the head of the topmast is a few feet above the lower cap. Lash girtline blocks on to the topmast head, and send the crosstrees up. Place them so that their after part may rest on the lower cap, and their fore part against the topmast. Lower the mast until the crosstrees fall into their place, then sway away again.

TO PLACE THE RIGGING OVER THE TOPMAST HEAD.

Q. Place the rigging over the topmast head.

A. Tar the mast in the way of the rigging; tar, parcel and place the bolsters. Put the shrouds over the mast head, in the same order as the lower rigging; then, the back stays, next, the topmast stay; and last, the lift strop.

TO SEND UP A LONG TOPGALLANT MAST.

Q. Send up a long topgallant mast.

A. Reeve the mast rope in a similar manner to that of the topmast.

Place the jack cross trees over the hole in the topmast cap. Put on a grommet, then the eyes of the stay or stays, then the eyes of the shrouds and backstays.

Next place a grommet for the royal mast, and the royal rigging in the same order.

Sway away, and point the mast through the jack; put on the truck with the signal haulyards rove in it; sway away and fid the mast.

Some vessels have their royals to set flying, in which case the stay is spliced into an iron traveller, which is placed *above* the topgallant rigging.

The use of a grommet is to prevent the eyes of the rigging coming over the mast hounds. When the stays are *underneath* the rigging, they serve the same purpose. Sometimes a strop, with a thimble in it for the main royal stay to reeve in, is used instead of a grommet.

The topgallant rigging reeves through the holes in the horns of the crosstrees, and sets up to the spider hoop.

CROSSING YARDS.

Q. Cross a lower yard.

A. Suppose it to be the foreyard, and that it is on the starboard side of the ship.

Place it with the port yard arm forward. If it be on the port side, place it the contrary way.

Fix a tackle from the fore-topmast head to the middle of the yard; make a rope fast to the foreward yard arm; sling skids up and down the side; heave away, and when the yard is nearly up to the rail, make a rope fast to the middle of it to ease it on board. Haul on the line at the yard arm, and get it under the fore stay; heave away, get the yard across the forecastle, and land it.

Dip the tackle through the collar of the fore-stay; make a single block fast to the middle of the yard; hook another block to one of the eye-bolts on the bowsprit; reeve a line through those blocks, and make the end fast to the other side of the bowsprit; the line will thus lead clear of the fore stay.

Take the ends of the lifts through the lift block at the cap; reeve the braces, heave away, and when the yard is high enough, steady and place the yards by the lines forward and the lifts; truss the yard, and shackle on the slings.

Q. Cross a topsail yard.

A. Bring the yard alongside the same as was done with the fore yard. Bend a yard rope to the slings, and stop it to the forward yard arm; sway away until the yard is up and down; put on the lifts, and reeve them as soon as it can be done; also reeve the braces. Sway away, cast off the stops, lower the upper lift, and take in the lower one until the yard is square. When the yard is high enough, steady it by the lifts and braces, and parral it. If it be a lower topsail yard, it will have to be trussed, and slung in a manner similar to the lower yard.

Q. Cross a topgallant yard or royal yard.

A. Those yards are sent up in a manner similar to a topsail yard.

Their lifts in some cases reeve through a bull's eye seized in the rigging, and come down and make fast to the crosstrees, but they often go with an eye splice over the mast head, so that the upper lift must be put on the yard arm first, and then the yard hoisted chock up so as to get the lower lift on.

RIGGING JIB-BOOM.

Q. Rig out a jib-boom.

A. Reeve the heel rope; heave the jib-boom out a little outside of the cap. If there be no iron band with eye bolts and thimbles in it, put a grommet on the boom, then the foot ropes, then the guys, and then the martingale stay.

Next put on the flying jib-boom gear in the same order. Reeve the jib stays through the hanks and hole in the jib-boom; next reeve the flying-jib stay, fore topgallant stay and fore royal stay. Overhaul all the gear, heave the boom out, secure the heel with the strop and lashing, and set up the gear.

SENDING YARDS AND MASTS DOWN.

Q. Send down a topgallant yard in a gale of wind.

A. Cast off the tie from the yard and bend on the yard rope with a half hitch close to the lee side of the chock, and a rolling hitch, or timber hitch at the weather side; cast off the foot ropes and put a slack lashing round the mast and yard to keep the yard steady, unparral the yard and sway away till the yard is at the mast head, cast off the lifts and braces, bend a line on the lower yard arm to steady the yard, put a lashing round the upper yard arm and the yard rope. Lower away abaft all to the windward.

Or shortly, thus: Put on a yard arm guy and preventer parral; lower away abaft all and to windward.

Q. Send down a topgallant mast in a gale of wind?

A. Hook a block on to the topmast cap, if there be no eye-bolt to hook the block to, lash it to the topmast head, reeve a mast rope through this block, through the sheave hole in the heel of the mast, and make its end fast to the other side of the topmast head, slack up the topgallant rigging and heave on the mast rope; when the weight is off the fid, knock it out and lower away. When the rigging is about a foot above the cap, surge up quickly to start it, lower till all the rigging is on the topmost cap, lash it to the cap, rack the two parts of the mast rope together, cast off the rope from the topmast head, reeve it through the sheave hole in the topgallant mast head and make it fast, bend a rope on to the heel of the mast to keep it steady, send the mast down abaft all and to windward.

Q. How do you take your main mast out, you have no spare spars?

A. Take the lower yards for shears; strengthen them at the lower ends, in the way of the sheave holes, with small spars lashed to them.

Q. There is a gang of rigging lying on deck, how do you know the foremast shrouds?

A. It is the shortest.

Q. How do you make a stopper knot?

A. Wall and crown, wall and crown.

Q. You are going into dock, or to lie up; unbend your sails and unrig your ship.

A. Dry the sails well before unbending them, put tallies with its name on every article as it is made up.

Q. Here is a piece of rope, is it right or left handed; coil it?

A. The candidate will state which it is, and will coil it.

Q. Shew how you would turn a dead eye in?

A. The candidate will do so?

Q. Does the fore topmast stay go over, or under, the crosstrees?

A. Over the after cross tree leg, under the fore one.

Q. You go on board of a ship with her three lower masts and bowsprit in, what would you secure first?

A. The bowsprit.

REMARKS.—The Examiner has a model mast, and he may require the candidate to explain by the model how he would perform any of the preceding operations; such as sending a topmast up, or crossing a yard.

Or he may require him to point out how he would perform the reverse operation; such as sending a mast, or yard, down.

PREPARING FOR CARGO.

Q. If the cargo be dry and perishable, and the ship a wooden one?

A. The carpenter should keep the upper works in good order. He should particularly examine the backs of the stanchions, combings, under the windlass and galley, and also the topsides and bends, down to the water.

Q. What should be done with the limbers, run, peeks, and coal hole?

A. They should be carefully cleaned.

Q. If coal, or other dirty cargo, has been discharged, and a cargo that will damage by dirt has to be taken in?

A. The hold must be thoroughly cleaned, and, if necessary, washed; but avoid washing if possible, as water gets into the seams of the ceiling and causes a dampness, which may damage the cargo.

Q. If wood, or other goods that will not go down the air ports, be taken?

A. Keep the air ports out.

Q. If the seams of the ceiling be wide and the cargo can get through them?

A. Fill them up with dry fir wood drove tight in, put the air ports in and secure them.

Q. If timber, or other light goods, be taken, what may have to be done?

A. It may be necessary to take in ballast. In this case, take in as much as will make the ship sea-kindly, and as some ships go down by the head with light goods, it may be necessary to trim the ship by the stern with the ballast.

DUNNAGE.

Q. Lay dunnage for grain or seed.

A. The small spars, or rickers, or whatever are used as beams to support the dunnage deals, ought to be laid fair with each other at their upper sides, so that the deals are equally supported. And the deals should be laid close so as to allow no grain to go below the dunnage.

Q. Lay dunnage for tea.

A. Small dry stones are taken in for ballast when about to load tea, and they are used for dunnage, they are levelled fore and aft, and laid to correspond with the shape of the beams athwartships.

Q. If sand ballast, gravel rattans, brushwood, firewood, &c., are used for dunnage, how should they be laid?

A. Sand ballast, gravel, or anything that will damage the cargo, ought to be covered with boards. Rattans, firewood, &c., should be laid no closer than is necessary to support the cargo, so that there may be room for water, if any get on to the ceiling.

Avoid horn shavings as dunnage from Calcutta.

Q. How do you lay the dunnage in the bilge?

A. The dunnage should be carried well up the round of the bilge, especially abreast the foremast; because when the ship heels over, the water dashes up there; also dunnage and mat well abreast of the main-mast, and in the way of the chain plates and pumps.

Q. How do you lay the mats?

A. Begin amidships and work fore-and-aft, over-lap one-third.

Place double mats on the dunnage, round the mast casings, and pump well. Single mats on the sides.

Q. What precautions do you take with the pumps when about to take in grain?

A. Fit them close through the ceiling, so that no grain can get to them if an accident happen to the pump well.

Also have a clear trunk way to their bottoms.

Q. What further precaution would you take with a grain cargo?

A. Build strong bulk heads to form peeks at the ends of the ship. Fix strong shifting boards, well secured. Have feeders and ventilators. If loading at the United States or Canada, the ship must be lined, and loose grain must be stowed in bins, not to contain more than 12,000 bushels each.

Q. What height do you dunnage for grain?

A. Not less than 10 inches on the floor, and 14 to 16 inches at the bilge. When lined, a water course between it and the side.

Q. What depth would you put shifting boards for grain?

A. From the upper deck nearly down to the "'twixt" deck.

Q. Secure a cargo of grain without shifting boards?

A. Carry it in bags, sacks, or barrels.

Q. What height for hemp, flax, wool, and cotton?

A. Nine inches on the floors, and to the upper part of the bilge, the wing bales of the second tier kept 6 inches off the sides at the lower corner, and 2½ inches at the sides.

Q. What height for tea, flour in barrels, flax, clover, linseed, rice in tierces, and coffee or cocoa in bags?

A. Nine inches at the floors, and 14 inches at the upper parts of the bilges.

Q. What precautions should be taken with ships above 600 tons?

A. They should have "'twixt" decks, or platforms laid, to ease the pressure.

Q. Should caulked "'twixt" decks have scuppers in the sides?

A. Yes; and 2½ inches of dunnage laid athwartships, not fore-and-aft, when the cargo is in bags; and not less than 1 inch dunnage when it is in boxes or casks.

Q. How high do you lay the dunnage for entire cargoes of sugar, saltpetre, and guano in bags?

A. Ten inches in the floors, 14 inches at the bilges.

Q. Would you carry your dunnage between decks into the sides?

A. No, I would leave a water course.

Q. How high do you lay the dunnage for pot and pearl-ashes, tobacco, bark, indigo, madder, gum, &c., whether in casks, cases, or bales.

A. In the bottom, and to the upper part of the bilges, at least 9 inches, and 2½ inches at the sides.

Q. How do you dunnage for miscellaneous goods; such as boxes of cheese, tubs of lard, or other small and slightly-made packages, not intended for broken stowage?

A. Dunnage the same as for other goods.

Q. How do you dunnage at the sides for manufactured goods; also dry hides, bales of silk or other valuable goods?

A. Dunnage 2½ inches at the sides to preserve a water course. Mats should be used at the sides for silk, tea, &c.

Q. What dunnage should flat-floored ships have?

A. They should have more than ships with a good rise of floor.

NOTE.—The preceding rules for dunnage are derived principally from Lloyds' Instructions, but in certain trades they are altered; thus in the Baltic the common rule for grain cargoes is 6 inches dunnage on the flat and 9 inches at the bilge. Sometime oats are loaded on the skin.

The rules for dunnage depend very much on the custom of the trade the ship is in.

STOWAGE.

Q. What precaution should you take while loading and discharging ?

A. Keep the ship upright and a few inches by the stern, so that the water may come to the pumps. Also keep the cargo spread fore and aft, lest it strain the ship. Try the pumps repeatedly. Every evening note the draught of water, and the tons' weight taken in during the day.

Q. You are about to load tar. Is there any particular precaution you should take ?

A. Yes ; the flat of the ceiling and to the upper part of the bilge should be caulked, the limber boards taken out, and a three-inch deal laid over the space and fastened to the limber strake, so that a large water-course may be left in case the tar leak from the casks and choke the limber holes. Spirits of tar should be provided to pour down the pumps in case they are likely to choke. Small round-mouthed scrapers, with long handles to scrape the inside of the pumps, should be got. No sand ballast should be left in the ship. Try the pumps repeatedly.

Q. Is there any precaution you should take while loading sugar in casks ?

A. Yes ; Molasses are apt to leak out of the casks ; and if neglected they will choke the pumps. Try the pumps repeatedly.

Q. Should the stanchions be kept in for every cargo ?

A. Yes ; they should.

Q. You are loading coals for a distant port. There is gas from the coals ?

A. Fix ventilators. Keep the hatches off as much as possible.

Q. You are loading grain in bulk ?

A. I would not allow it to come in too fast. Pour it through a canvas hose, to prevent dust from arising as much as possible. Watch that the grain does not get under the mats. If necessary trample it well. Be very careful that it is well trimmed under the beams, stringers, and decks.

Q. How much grain can you take in bulk at New York ?

A. No vessel exceeding 400 tons register can be loaded with grain in bulk.

Exceeding 400 tons and not over 500 tons, two thirds in bulk, one-third in bags. Over 500 tons, half in bulk and half in bags.

Q. How would you raise ore, sulphur, iron, or other heavy cargo ?

A. By laying empty casks along the bilge.

Q. You are loading timber or deals ?

A. Be particular that the ends of the timber or deals, are a few

inches clear of the ship's ceiling, especially forward and aft; and also that the hold beams do not bear any of the weight.

Wedge the cargo under both hold and deck beams.

Q. You are taking mast pieces in?

A. Take them in with a strop, and pinch them with handspikes. If dogs and crowbars be used they will damage the masts.

Q. You are taking in very long mast pieces for China junks at Singapore. You have only one bow port.

A. It may be necessary to lift the foremast, in order to get some of the long spars to the other side of the ship.

Q. In loading timber, where do you stow the heaviest?

A. At the bottom of the ship.

Q. You are loading a cargo of heavy goods?

A. Raise them well up; otherwise the ship will be laboursome.

Keep both ends clear of heavy cargo.

Q. How do you stow bar iron?

A. Grating fashion. Bring it up towards the main hatch. Protect the sides of the ships with bars laid fore-and-aft.

Q. How do you secure railway iron?

A. By planks laid across it, and shores to the beams and sides.

NOTE.—At Newport railway iron is stowed as follows:—Dunnage is laid to level the hold, 2 or 3 bars are then laid close together alongside the keelson, then a space of about 6 or 8 inches, then other 2 or 3 bars, and so on till the bars are above the keelson, then grating fashion, and the upper tiers are solid and locked together.

Q. You are in a steamer loading railway iron, how do you protect the tunnel?

A. By laying rails on it fore-and aft, or by covering it with coals, or dunnage.

Q. How do you stow machinery?

A. The heavy parts first, in 'midships, chock and secure them well.

Q. How do you stow pig iron?

A. Cross bar and solid forward and aft and in the sides, solid amidships and brought up to the main hatch.

Q. How do you stove iron ore, or copper ore?

A. Some ships are properly adapted for this trade by having a trunk-way built for the cargo. If the ship be not properly adapted, raise the cargo well up and bring it towards the main hatchway, keep the ends of the ship clear.

Q. If the cargo do not fill the ship, what must be done ?

A. Secure the cargo by planks on it, and strong shores to the sides and beams.

Q. In loading any cargo that is stowed in tiers, such as timber, deals, sugar in boxes or casks, tea in chests, and so on, how do you lay the lower tier ?

A. Lay the lower tier so that there may need no broken stowage under the beams. In stowing casks. Let the bilge of one cask lie against the two ends that touch each other of the casks alongside of it, and the bilges of the second tier in the hollow spaces of the first tier.

Q. Here are models of casks, stow them?

A. The candidate will do so.

Q. How would you keep casks bilge free athwartships ?

A. Put wedged shaped quoins between them.

Q. Where should acids be carried ?

A. On deck, ready to throw overboard.

Q. Should stowers be allowed to handle goods in bales or bags with hooks ?

A. No ; lest they damage the goods.

Q. How do you stow bale goods ?

A. Marks and numbers uppermost. On their flats in 'midships and on their edges in the wings. 2½ inches off the side at the lower corner

Q. How should oils, wine, spirits, beer, molasses, tar, &c., in casks be stowed ?

A. Bung up and bilge free; good cross beds at the quarters; do not trust to hanging beds; and to be well chocked with wood. In loading brandy at France, even small ships, say 250 tons, must have a platform laid on their beams to preserve the lower tiers from too much pressure.

Q. How many heights are allowed ?

A. Three heights of pipes or butts, four of puncheons, and six of hogsheads or half puncheons.

Barrels of provisions and casks of tallow allowed to stow six heights.

Tar, turpentine, resin, &c., to stow six heights.

Q. How many gallons are there in each ?

A. Pipe or butt, 126 gallons. Puncheon, 84. Hogshead, 63.

Q. How do you know that the bung of a cask is uppermost when it is dark ?

A. By feeling the rivets uppermost.

Q. How do you know the cask is bilge free ?

A. By feeling with the hand.

Q. Where do you begin to stow casks, or timber?

A. Generally in 'midships, sometimes at the pump well, so as not to lose stowage.

Q. Where do you stow moist goods and liquids, such as salted hides, bales of bacon, butter, lard, grease, castor oil, &c.

A. Not too near goods whose nature is to absorb moisture.

Q. You are loading a general cargo, consisting partly of rough and hard goods, such as coals, grindstones, metals, bundles of sheet iron, iron rods, pigs of copper or iron, &c., and partly of goods in bags or bales, which are liable to be chafed, or damaged by contact with rough goods. How would you stow the goods?

A. The rough goods in general underneath, and foreward of the fine goods, and separated from them by boards or dunnage.

Q. How would you stow brittle goods, such as glass, bottles, earthenware, &c.?

A. In a place by themselves, with plenty of straw.

Q. How would you stow goods in casks and goods liable to damage from leakage of the casks?

A. Keep the goods liable to damage above the casks, or forward or aft of them.

Q. You are in a steamer which is loading a general cargo for different ports. How would you stow the goods?

A. Keep the goods intended for the first port uppermost if possible, and so that the ship will be on a trim when they are taken out. Note what hold, and what part of that hold, every merchant's goods are in.

Q. Where would you stow bullion?

A. In the bullion room under the cabin deck.

Q. You are loading a general cargo, and a lighter of petroleum, turpentine or similar strong smelling goods comes alongside. What would you do with it?

A. Refuse to take it in; for the vapour from the petroleum, turpentine, &c., would spoil food of any kind. Call the Captain's attention to it.

Q. There is a cask, bale, or package, in the hold damaged, what will you do with it?

A. I will not move it until I call the captain's attention to it. It may be necessary to have a survey upon it.

Q. You are loading grain in bulk, your ship has "twixt" decks laid; would you have shifting boards below them?

A. Yes; grain is as liable to shift there as above.

When discharging a boiler or other heavy pieces of machinery in an open roadstead, with a swell rolling in, when shears cannot be used, take a good warp and make a span by coiling it round both lower mast heads, using chafing gear where required, frap all parts together in the way of the purchase, cant the main yard and top it up, untruss and lash it to the mast, take the top-sail sheets for preventer lifts, rig a derrick with its foot near the side of the ship and lash it to the yard;

have a good after guy and the main braces set taut; in lifting the weight assist with the derrick purchase, when high enough and over the rail great care should be taken in lowering, and as soon as the lighter takes the weight off the purchases, let go them; holding on to place the weight so as to trim the lighter is very dangerous, for when the ship rolls from the lighter, and brings the weight suddenly on the purchases, it may carry them away and do a great deal of damage.

A case happened in Colombo: a barque was discharging a rice mill, the lighter had taken the weight of the mill, the purchases were held on to place it in some other part of the lighter, the ship rolled from the lighter, brought the weight so suddenly on the purchases that it carried them away, sunk the lighter, and went to the bottom.

GETTING READY FOR SEA.

Q. The ship is load; get ready for sea?

A. Batten the hatches down, and secure everything that is loose and is not wanted in going out. Get up the towline, warps, lines, and cork fenders. See that the lamps and compasses are in order, that no loose iron is near the binnacle, that the wheel chains and rudder are in order, and that an anchor and chain are ready. In a steamer, see that there are no ropes near the propeller, and that in going out the propeller does not strike the dock side.

LOG LINE AND LOG GLASS.

Q. What is the short rule for to find the length of a knot, corresponding to the time measured by a log glass?

A. Affix a cipher to the seconds, divide by 6, the quotient will be the length in feet.

If there be a remainder, affix a cipher and divide as before. Multiply the decimal part by 12, and the product will be inches.

Q. What is the long rule?

A. Multiply 6080 by the seconds, and divide the product by 3600.

Q. Give an example in both ways, the time by the glass being 30 seconds?

A. Short way:

sec.
6)300

Answer.....50 feet.

Long way:

sec.		sec.		feet.
3600	:	30	: :	6080
				30

36,00)1824,00(50 ft.
180

24
12

36)288(8 in.
288

Answer...50 feet 8 inches.

Q. A glass runs 28 seconds: require the length of a corresponding knot.

	feet	inches
Answers.—Short way...	46	8
Long way...	47	8½.

THE LEAD AND LEAD LINE.

Q. How do you mark the land lead line?

A. At two fathoms.....leather, with two parts sticking out.
,, three ,, ...leather, slit, so that three parts stick out.
,, five ,, ...white bunting, or rag.
,, seven ,, ...red bunting.
,, ten ,, ...leather with a round hole.
,, thirteen ,, ...blue bunting.
,, fifteen ,, ...white bunting.
,, seventeen ,, ...red bunting.
,, twenty ,, ...a piece of cord with two knots.

The hand lead line is not marked farther than twenty fathoms.

NOTE.—It is always best to have the lines fitted with calico for white marks, bunting for red marks, and serge for blue marks; because a man can tell the difference by the feel in the dark.

Q. How do you mark the deep sea lead line?

A. The deep sea lead line is marked in the same way as far as twenty fathoms; at thirty fathoms it is marked with three knots; at forty fathoms with four knots; and so on, an additional knot at every ten fathoms. Every intermediate five fathoms, above twenty, is marked with one knot, or with a piece of leather.

Q. Take a cast of the hand lead.

A. I would be careful not to overheave it, especially the first cast.

Q. When would you stop the line from running out?

A. As soon as the lead struck the bottom; or as soon as the ship by her motion brought me over the lead.

Q. You are about to make the land, it is deep water, take a cast.

A. Arm the lead, pass it and the lead line forward and to windward. Stop the ship's way by stopping the engine; or by reducing sail and rounding to.

Q. It is a dark night, and you cannot see the marks, how do you know the soundings?

A. Deep cast. Take the line to a light. Shoal cast. Count the marks from the lead, till I come to say, the 5 or 7 fathom mark, take that mark in my left hand, heave the lead, keep my fingers close to the line so that I can feel any other marks that go out, but not so close as to stop the line. When soundings are struck, allow for the distance of the mark above the surface of the water. *Note.*—Read the previous note.

Q. You are about to make the land. It comes on a fog?

A. Keep the ship under command, proceed cautiously, and sound very often.

Q. Where are a steamboat's limbers?

A. At the sides of the tanks.

MANAGEMENT OF A SAILING SHIP AT SEA.

Q. It is coming on to blow fresh, take in the light upper sails; say the royals or topgallant sails.

A. Send a hand or two aloft ready to pick the sail up; lower the haulyards; haul up the lee clueline and buntline; then the weather ones; haul in the weather brace and spill the sail.

Q You are caught in a squall?

A. Take in the mizen, and keep the ship before the wind; see that the ropes are clear of the rudder; clew up, haul down, haul the yards by, and stow as fast as possible.

Q. You are taken aback?

A. Take in the mizen, shiver the after yards; when the ship falls off, fill the fore yard.

Q. You are running, reef the topsails?

A. Keep the ship before the wind. Reef the fore topsail first; then take the fore yard forward, so that the ship will lie on the course on which she will be most easy; haul the main sail up; haul the main yard by, and reef the main topsail? watch the helmsman while the crew are reefing.

Q. The wind is abeam?

A. Lay the topsail yard parallel with the lower yard, or nearly so, and reef the sail.

It may be necessary to reef one sail, and set it before reefing the other in order to keep the ship quiet. In some cases it is necessary to check the braces and start the topsail sheets.

Be particular that the yard is laid to pass before the men go aloft; if not, they may have to go out by the lifts, and in by the reef tackles, while the sail is slatting about in a most dangerous manner.

Q. You are running with the wind on the quarter, the ship cannot be brought to the wind nor kept away, you want the foresail on the ship so that you canmot square the fore yard; reef the foretopsail.

A. Clue it up as if I intended to stow it.

Q. Reef a course?

A. In order to reef a course, it is generally necessary to haul the sail up as for stowing.

Q. Take in a course?

A. Haul tight the lower lifts; ease off the lee sheet a few feet; man the buntlines and leechlines; haul them well tight; ease away the tack; haul up the weather clue garnet, buntlines, and leechlines, ease off the lee sheet, haul up the lee clue garnet, and all the gear, then haul tight the weather brace.

Some experienced men consider it better to haul the lee clue garnet close up before starting the tack.

Q. Sometimes a foresail is carried so long upon a ship, that it is very difficult to stow it; the sail blows out of the men's hands before they can get the gaskets passed; they are then placed in great danger.

A. In such a case, it would be as well to have three or four spilling lines passed over the yard and under the sail. After the sail is hauled up by its gear. haul up those spinning lines.

Q. Take in the jib?

A. Keep the ship away, so as to take the weight out of the sail, haul it down and stow it; then keep the ship on her course.

Q. Clue up a topsail in a gale of wind?

A. Haul the weather clueline up first, then man the buntline and lee clueline. Some experienced men haul the lee clue up first.

Q. Take in the mizen?

A. Lower it down; do not brail it up.

Q. You are scudding?

A. Be careful with the helm; have the relieving tackles ready; the wheel chains should be rather tight; the ship should be under close-reefed topsails, reefed foresail, and fore topmast staysail with its sheet hauled flat aft.

Q. It is blowing a gale; lay the ship to.

A. After taking the foresail off the ship, watch for a smooth, and when there is one, haul the main yard forward, and bring the ship to as quick as possible; haul tight the lower lifts, ease off the lee sheet first, and stow the fore topsail.

The ship should be laid on the tack on which she will take the sea most easily. It is well to forereach under close-reefed topsails, and low fore-and-aft-sail, when it can be done.

Remarks.—The writer was conversing with two of his friends; they were both experienced men, and had been for a considerable time exposed to extremely heavy weather in crossing the Bay of Biscay; many a time, when night closed in upon them, they did not expect to see the morning. One of them attributed his safety to laying his ship to under a balanced reefed trysail; the ship had no head way, so that her wake was right to windward of the ship, thus causing a comparative smooth; ahead and astern of the ship, the waves were breaking in a dangerous manner.

Q. Shift sails in a gale of wind?

A. The sail must be kept as quiet as possible; thus, if it be a topsail, lay the sail to pass for bending; tie a few of the close-reef points round the foot, then a few of the second reef points, and so on. Send the sail up; pass the first reef earring, and tie the points; take in as many reefs as are necessary, and set the sail; it can be properly bent when the weather falls fine.

Q. Shake out a reef?

A. Settle the haulyards a little, and haul upon the reef tackles; two men must loose the points, beginning at the bunt and going outwards; see that the points are not jammed between the yard and rigging before the earrings are eased off.

Q. When is a ship liable to miss stays, and when is she not liable to do so ?

A. In blowing weather, with strong sea, or in light winds, they often do miss stays. In moderate weather, and smooth sea, a loaded ship will very rarely miss stays, neither will a light one do so if due care be taken.

Q. Tack against a strong sea, blowing hard ?

A. Keep the ship well full, watch a smooth, ease the helm down, haul down the jibs, haul in the spanker sheet; when the ship is head to wind, and loses her head way, check the fore bowline and fore braces, and shift the helm into midships; when the wind is about half a point on the other bow, so that it is certain the ship will come round, mainsail haul. In ordinary cases, mainsail haul before the wind comes right ahead.

Q. Tack ship in moderate weather ?

A. Keep the ship well full; then the following are the principal orders in succession, as may be required. Ready about. Ease the helm down; hard a lee; ease off; tacks and sheets; mainsail haul; let go and haul.

Q. It is bad weather, one of your shrouds, or other important rope, is likely to part.

A. Clap a stopper on it.

Q. Wear ship ?

A. Brail up the spanker, shiver nearly the after square sails, keep them lifting full, put the helm up. When it is blowing hard, it is advisable to haul down the fore-and-aft sails when the ship is before the wind; square the foreyard, and bring the ship to the wind; trim the sails.

Q. The ship has come up in the wind, it is light ?

A. Put the helm up, ease off the trysail sheet, and flatten in the head sheets.

If the ship do not fall off: box her off, by letting go the lee fore braces and fore bowline, and hauling in the weather braces.

Q. It is thick, the wind is along the land, you are standing towards it and make it suddenly half a cable's length off; what would you do ?

A. Stay ship; if she refuse to stay, haul the yards flat aback, jibs down, mizen sheet ablock and put the helm hard a weather, keep the sails aback until she has lost stern way; then, brail the mizen up, hoist jibs, sheet to windward, fill the foreyard slap, keep the after yards shivering full until the wind is on the other quarter, then trim the yards.

NOTE.—The preceding operation is called *Making a stern board*; its object is to bring the ship far enough astern so that she may have room to wear clear of the land.

If the ship fall off too fast keep the foreyard not so flat aback as the mainyard.

Q. What are the proper sails for backing and filling in a tide way ?

A. Two topsails and trysail ; it is often practised under the main topsail.

Put the helm down, and lay the ship broadside on to the tide, with her head towards the weather shore. When she is in the middle of the stream, square the yards so that the wind may have little effect on them, thus the ship will drift faster.

If she draw towards the shore ahead, haul all flat aback, and haul in the trysail sheet, and thus force the ship astern. If she draw towards the shore astern, fill on her.

Q. Your ship is on a lee shore, there is anchorage, she will not stay ; and there is no room to wear; how can you get her on the other tack ?

A. Club haul her as follows: Get the lee anchor ready, and a spring on it from the lee quarter, and have the chain ready for slipping.

Put the helm down as in tacking ship, and when the vessel loses headway, let go the anchor, and mainsail haul; as soon as the anchor brings the ship's head to wind, slip the chain, and hold on the spring until the sails fill, then cut the spring.

Q. It is your watch. What would you do?

A. Pay particular attention to the captain or chief mate's orders. Keep a bright look out myself, and make others do the same. Keep a watchful eye on the helmsman. Be particular with the pumps. At night time be very careful to have the ship's lights in order.

Q. It is coming on dark ?

A. Look carefully round the decks, and aloft, examine the mast coats and tarpaulins, secure everything that is loose, parcel any rope that may be likely to chafe through the night.

Q. It is breaking day ?

A. Go aloft and examine everything there, do the same about the deck, repair any damage that may have occurred during the night.

Q. You have had heavy weather, you have in a grain cargo which has settled, or you are load with timber, casks, or bales, which have got loose ; it is now moderate weather ?

A. Take off the hatches, fill up the hold with grain from the peeks; or whatever may be the cargo secure it.

Q. A gale of wind is coming on, what gear will you have handy ?

A. Spare gaskets, reef earrings, and ratline line.

Q. Your lower cap is bad, or carried away, how would you secure the topmast ?

A. With a Spanish cap; that is, with a small chain, passed round the lower mast head and topmast, and frapped together. The jib-boom may be secured in the same way.

MANAGEMENT OF A STEAMER AT SEA.

Q. Are the sails much benefit to a steamer?

A. Yes, they steady the vessel, and ease the pressure on the engine.

Q. The wind comes strong ahead and raises a heavy sea?

A. Report to the captain, and ask him if he will allow the engines to be eased, and the ship kept off her course a point or two, so that she may take the sea easy.

Q. The ship is rounding a point, a strong tide is running, and other ships are coming the opposite way?

A. Be very attentive.

Q. You are about to make the land, or nearing shoals, it is a hazy night, and the ship's position is not certain?

A. Keep on the safe side, steer an outerly course, pay great attention to the lead, look-out and compasses; and if possible keep the ship upright to avoid heeling deviation.

Q. How will a steamer's stern turn when you reverse the engine?

A. With a right-handed propeller it will turn to port; with a left-handed propeller it will turn to starboard.

Q. In a steamer. Engine broke down. Or in a sailing ship. Masts, or sails gone. Heavy sea, contrary wind. How do you keep the ship quiet?

A. Rig a sea anchor, ride by a spar, pay out chain, or pay a hawser out of the hawse pipe, pass the end to about the fore rigging and ride by the bight to keep the ship's head to the sea.

Q. You have a fresh crew, what would you teach them first?

A. To drive the steam winches.

Q. When leaving winches under steam what would you do?

A. Shut the throttle valve and open the drain cocks in the bottom of the cylinder, to allow the condensed steam to escape, otherwise, when starting again, I might split the cylinder bottom.

Q. In what position must the man stand who is driving the winch?

A. His left hand must be near, or on, the throttle valve, his right hand on the slide valve lever, and one foot near the brake.

Q. You are navigating by dead reckoning, and when you get observations you find yourself 30 miles out, how do you account for that?

A. The error may be caused by errors in the log or glass; by improper allowance for deviation, variation, or leeway; by bad steerage; or by an unknown current.

Q. You come on deck, what are the first things you do ?

A. Ask the captain or first mate for orders, ascertain that the fresh steersman knows the course, at night see that the lights are burning bright, on a coast take the bearing and distance of the land.

Q. You see a light ship with a yard 30 feet above the water; in day time you see two balls on one side, and one on the other, below the yard arm, at night there are two lights on one side and one on the other; what do those signals indicate ?

A. They indicate a wreck, and I must pass on the side on which the two balls, or lights are.

Extracts from Rules published by the Royal National Lifeboat Institution; on the Management of Open Rowing Boats in a Surf; Beaching them, &c.

ROWING TO SEAWARD.

1. "Dodge" the sea, if possible, so as not to meet it at the moment of its breaking.

2. Get all possible speed on a boat on the approach of every sea which cannot be avoided.

RUNNING BEFORE A BROKEN SEA.

1. Avoid every sea, as far as possible, by placing the boat where the sea will break ahead or astern of her.

2. Bring the boat's bow to seaward, especially if she have a square stern, and back her in, row ahead against every sea which cannot be avoided.

3. If proceeding to the shore bow foremost, back the oars against each sea on its approach; tow a drogue astern.

4. Trim the boat by the end that is to seaward.

5. If running under sail, take sails and mast down before entering the broken water.

BEACHING ON A STEEP BEACH.

Whether under oars or sail, retain speed right on to the shore, and in the act of landing turn the boat's bow half round to the direction of the sea, so that she may be thrown broadside on to the beach.

BOARDING A SHIP IN A HEAVY SEA.

Board the vessel on the lee side, if possible; if this cannot be done for wreck floating about, board at the bow or stern, or anchor from 100 to 150 fathoms to windward, and veer out cable till near enough to throw a line on board.

The rope made fast to the ship must be long enough to allow the boat to rise and fall freely with the sea, and a man must stand by to cut or slip it if necessary.

ON THE EFFECT OF OIL IN PREVENTING THE WAVES OF THE SEA FROM BREAKING.

Captain George Carr told the author that on December, 1860, he was wrecked in the "Gratitude," on the Isle of Sein, France. It was a dreadful gale of wind with a very high sea, so that the crew had very great difficulty in getting their boat out, until they poured a tank full of oil into the sea, and in the words of Captain Carr, "it had a magic effect" in smoothing the sea and preventing the waves from breaking; they took another tank full of oil into the boat, and poured it into the sea as they proceeded to the shore. "And so it came to pass that they escaped all safe to land."

Captain John Knill, of Seaham, has kindly collected, for insertion in this book, the following instances of the beneficial influence of oil poured on the troubled waves, stilling the raging sea, and thus saving precious lives:—

Mr John Thompson, now residing at Seaham, was formerly in the Greenland trade, and has seen the effect of oil on the troubled waters of the North Atlantic. He was one of the crew of the "Clifton Hall," when that ship sprung a leak and was foundering in a great storm in February, 1867; the crew got the long boat out, with great difficulty, the sea running high and topping frequently, and 13 people got into it; they took all the oil they could muster into the boat, and made for Long Hope, Orkney, and whenever a wave was likely to top on the boat they poured some oil on the water, and it prevented the waves from breaking upon them, and thus they got safely into Long Hope, to the great astonishment of the islanders, who were filled with wonder to see a boat live in such a storm.

Another instance was that of the "Frederike," lost on the Aberty Sand, on the 22nd of April, 1877. All the efforts of the crew made to launch their boat were in vain, until they poured oil into the sea, and then launched their boat successfully, and thus 14 men made their escape through a broken sea by means of a few gallons of oil.

Captain Knill proposed that a tube should be laid in the bed of the sea at the entrance of the Tyne, and when there was a heavy, dangerous sea on the bar that oil should be forced through the tube; and some very interesting experiments have been made by throwing oil on the surface of the sea by means of a rocket.

The following instances of the wonderful power of oil poured on the sea are extracted from *Chambers' Journal* for August 31st, 1878, and January 31st, 1879:—

In 1770, a Dutch East Indiaman was saved from wreck in a storm, by pouring a jar of olive oil on the sea.

A Danish ship sunk at anchor off the Island of Port Santo, the crew took to their boat, and poured a keg of oil overboard which, though unable to lessen the height of the waves, yet it prevented them from breaking, so that the crew got safe to land.

A master stated in the *New York Shipping Register*, that in 1864, in the heaviest gale of wind ever he experienced, he lost all his sails and

his rudder, and in another hour the vessel would have foundered, but 5 gallons of oil poured out slowly to windward lasted 56 hours, and saved the crew, ship, and cargo.

The "King Cenric," Captain Betts, was in a gale which raged with determined fury for nearly 5 days; the chief mate, Mr Bowyer, got 2 canvas bags in each of which he poured 2 gallons of oil, he punctured them slightly and towed them astern, one at each quarter; the effect was magical, it caused a large space of calm water in the wake of the ship, relieved her from the mass of water which had burst over her stern and quarters, and the crew were thus able to repair damages. The two bags lasted two days, after which the worst of the gale being over, no more oil was used; 4 gallons of oil saved the lives of the crew, the ship, and the cargo.

The ancient author, Pliny, mentions that in his day divers used to throw oil to lessen the roughness of the sea; the course taken by shoals of herrings or pilchards can be easily observed by the oil from them causing streaks of smooth water in the midst of the otherwise turbulent element. The sea never breaks round the body of a dead or harpooned whale. The cook's slush, or coal tar, thrown overboard, has caused a rough sea to become remarkably smooth. In Newport Harbour, U.S., the sea is always smooth when there are any whaling ships at anchor, from the waste oil and blubber from them; vessels in the Labrador and Newfoundland trade, when running in a gale, sometimes throw oil overboard to prevent the sea from breaking over them.

A correspondent mentions a few of the numerous cases that oil might be beneficially applied to; for instance:—

To facilitate the launching and landing of life-boats, boarding of wrecks, the riding of fishing boats at their nets and lines, life-boats should take a supply of oil with them to pour into the sea when they go off to a wreck; a shell might be made to contain oil, and to burst when fired from a gun, and it fell into the water, to facilitate the entrance of ships into such harbours as Aberdeen or the Tyne in heavy gales.

ANCHOR LIGHT.

Q. What light must be shown by either sailing ships or steamers at anchor?

A. A white light in a globular lantern of 8 inches diameter. (Art. 8.)

Q. Where is the anchor light to be exhibited?

A. Where it can be best seen. (Art. 8.)

Q. At what height?

A. Not more than 20 feet above the hull. (Art. 8.)

Q. In what direction must it show?

A. All round the horizon. (Art. 8.)

Q. At what distance must it be visible?

A. At least one mile. (Art. 8.)

SAILING SHIPS' LIGHTS UNDER WEIGH.

Q. What lights must sailing ships carry when under weigh at night?
A. Two. *Green* to starboard. *Red* to port. (Art. 6.)

Q. How are those side lights fixed, and how far should they be seen?
A. Fixed so as each to shew over 10 points: from right ahead to 2 points abaft the beam on each side.
Seen. At least two miles. (Art. 3.)

Q. Are the side lights to be fit with screens. If so, how?
A. Yes. On the inboard side.
At least three feet from the light forward.
So placed that the lights cannot be seen across the bow. (Art. 3.)

STEAM SHIPS' LIGHTS UNDER STEAM.

Q. What lights have steamers to carry when under steam at night?
A. Three. *White* on, or in front of the foremast. *Green* to starboard. *Red* to port. (Art. 3.)

Q. What height must the mast head light be?
A. At a height above the hull of not less than 20 feet; and if the breadth of the ship exceed 20 feet, then at a height above the hull of not less than such breadth.

Q. Over how many points, in what direction, and how far should the mast head light show?
A. Over 20 points. From right ahead to 2 points abaft the beam on both sides. Visible at least 5 miles. (Art. 3 *a*.)

NOTE.—In order that the mast head light may shew 5 miles, it must not be less than 17 feet above the level of the sea.

Q. Is there any distinction between a steamer's side lights and a sailing ship's?
A. There is none. (Art. 6.)

Q. What lights are steamships required to carry when towing other ships?
A. An additional white light, not less than three feet below the fore mast head light; and of the same kind as it. (Art. 4.)

Q. When a steam ship, or a sailing ship, is laying down a telegraphic cable, or is picking it up, or which from any accident is not under command, what lights shall she carry by night, and what signals by day?
A. By night three red lights in globular lanterns, each not less than 10 inches diameter, one over the other, not less than three feet apart, in the same position as the white light which steam ships are required to carry.

By day. One over the other, not less than three feet apart, in front of, but not lower than her foremast head, three black balls or shapes, each two feet in diameter.

The above ships when not making any way through the water, shall not carry the side lights; but when making way shall carry them.

Q. What lights shall a vessel when employed in drift net fishing carry?

A. Two red lights, one over the other, not less than three feet apart.

Q. What lights shall a trawler at work carry?

A. Two lights, one over the other, not less than three feet apart, the upper light red, and the lower green; and shall also carry the side lights, or have ready the coloured lights as in (Art. 7), or the lantern with the red and green glass.

Q. When steamers are not under steam, but are under sail only?

A. Side lights only, the same as sailing vessels. (Art. 1.)

EXCEPTIONAL LIGHTS. SMALL VESSELS. PILOT VESSELS. FISHING BOATS.

Q. Small vessels, bad weather, lights cannot be fixed?

A. Keep each light on deck on its respective side, ready for instant exhibition when coming near another vessel.

The lanterns should be painted the colour of the light they contain. (Art. 7.)

Q. What light must sailing pilot vessels carry?

A. A white light visible all round the horizon, and to burn a flare-up at short intervals, not to exceed 15 minutes. (Art. 9.)

Q. What lights must open boats and fishing boats carry?

A. A lantern with red glass on one side, and green on the other. (Art. 10.)

Q. When fishing vessels and open boats are at anchor, what lights must they exhibit?

A. One white light.

Q. May open boats use a flare-up?

A. Yes.

Q. Is this flare-up instead of the lantern with the coloured slides, or is it in addition to it?

A. It is in addition to it.

SIGNALS IN FOG, MIST, OR FALLING SNOW.

Q. You are at anchor, in fog, mist, or falling snow; whether by day or night; in either steamer or sailing ship?

A. Ring a bell at least every two minutes. (Art. 12.)

Q. You are under weigh in a sailing ship ?

A. Make with the fog horn at intervals of not more than two minutes,

When on the starboard tack, one blast.
When on the port tack two blasts in succession.
When with the wind abaft the beam three blasts in succession. (Art. 12.)

Q. You are under weigh in a steam ship ?

A. Make with the steam whistle, or other steam sound signal, at intervals of not more two minutes, a prolonged blast. (Art. 12.)

Q. What other precautions will you take ?

A. Go under easy sail, or steam. And, if in soundings, frequently take a cast of the lead.

REGULATIONS FOR PREVENTING COLLISION AT SEA.

NOTICE.—On and after the 1st *of January,* 1880, *Candidates for Masters,* 1st *Mates, Only Mates, and* 2nd *Mates' Certificates of Competency (whether for Foreign-going or for Home-trade Passenger Ships), will be required to pass an Examination in the Revised Regulations for preventing Collisions at Sea.*

The Regulations in question come into force on the 1st *of September,* 1880.

THOMAS GRAY,
Assistant Secretary,
Marine Department.

By Order of the Board of Trade,
September, 1879.

FIRST SCHEDULE.

Regulations for Preventing Collisions at Sea.

Preliminary.

Art. 1. In the following rules every steam ship which is under sail and not under steam is to be considered a sailing ship; and every steam ship which is under steam, whether under sail or not, is to be considered a ship under steam.

Rules concerning Lights.

Art. 2. The lights mentioned in the following Articles, numbered 3, 4, 5, 6, 7, 8, 9, 10, and 11, and no others, shall be carried in all weathers, from sunset to sunrise.

Art. 3. A seagoing steamship when under way shall carry—

(*a.*) On or in front of the foremast, at a height above the hull of not less than 20 feet, and if the breadth of the ship exceed 20 feet then at a height above the hull not less than such breadth, a bright white light, so constructed as to show an uniform and unbroken light over an arc of the horizon of 20 points of the compass; so fixed as to throw the light 10 points on each side of the ship, viz., from right ahead to two points abaft the beam on either side; and of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of at least five miles.

(*b*) On the starboard side, a green light so constructed as to show an uniform and unbroken light over an arc of the horizon of 10 points of the compass; so fixed as to throw the light from right ahead to 2 points abaft the beam on the starboard side; and of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of at least two miles.

(*c.*) On the port side, a red light, so constructed as to show an uniform and unbroken light over an arc of the horizen of 10 points of the compass; so fixed as to throw the light from right ahead to 2 points abaft the beam on the port side; and of such a character as to be visible on a dark night, with a clear atmosphere, at a distance of at least two miles.

(*d.*) The said green and red side lights shall be fitted with inboard screens projecting at least three feet forward from the light, so as to prevent these lights from being seen across the bow.

Art. 4. A steam ship, when towing another ship, shall, in addition to her side lights, carry two bright white lights in a vertical line one over the other, not less than three feet apart, so as to distinguish her from other steam ships. Each of these lights shall be of the same construction and character, and shall be carried in the same position as the white light which other steam ships are required to carry.

Art. 5. A ship, whether a steam ship or a sailing ship, when employed either in laying or in picking up a telegraph cable, or which from any accident is not under command, shall at night carry, in the same position as the white light which steam ships are required to carry, and, if a steam ship, in place of that light, three red lights in globular lanterns, each not less than 10 inches in diameter, in a vertical line one over the other, not less than three feet apart: and shall by day carry in a vertical line one over the other, not less than three feet apart, in front of but not lower than her foremast head, three black balls or shapes, each two feet in diameter.

These shapes and lights are to be taken by approaching ships as signals that the ship using them is not under command, and cannot therefore get out of the way.

The above ships, when not making any way through the water, shall not carry the side lights, but when making way shall carry them.

Art. 6. A sailing ship under way, or being towed, shall carry the same lights as are provided by Article 3 for a steam ship under way, with the exception of the white light, which she shall never carry.

Art. 7. Whenever, as in the case of small vessels during bad weather, the green and red side lights cannot be fixed, these lights shall be kept on deck, on their respective sides of the vessel, ready for use; and shall, on the approach of or to other vessels, be exhibited on their respective sides in sufficient time to prevent collision, in such manner as to make them most visible, and so that the green light shall not be seen on the port side nor the red light on the starboard side.

To make the use of these portable lights more certain and easy, the lanterns containing them shall each be painted outside with the colour of the light they respectively contain, and shall be provided with proper screens.

Art. 8. A ship, whether a steam ship or a sailing ship, when at anchor, shall carry, where it can best be seen, but at a height not exceeding 20 feet above the hull, a white light, in a globular lantern of not less than eight inches in diameter, and so constructed as to show a clear uniform and unbroken light visible all round the horizon, at a distance of at least one mile.

Art. 9. A pilot vessel, when engaged on her station on pilotage duty, shall not carry the lights required for other vessels, but shall carry a white light at the masthead, visible all round the horizon, and shall also exhibit a flare-up light or flare-up lights at short intervals, which shall never exceed fifteen minutes.

A pilot vessel, when not engaged on her station on pilotage duty, shall carry lights similar to those of other ships.

Art. 10. (*a.*) Open fishing boats and other open boats when under way shall not be obliged to carry the side lights required for other vessels; but every such boat shall in lieu thereof have ready at hand a lantern with a green glass on the one side and a red glass on the other side; and on the approach of or to other vessels, such lantern shall be exhibited in sufficient time to prevent collision, so that the green light shall not be seen on the port side, nor the red light on the starboard side.

(*b.*) A fishing vessel, and an open boat, when at anchor, shall exhibit a bright white light.

(*c.*) A fishing vessel, when employed in drift net fishing, shall carry on one of her masts two red lights in a vertical line one over the other, not less than three feet apart.

(*d.*) A trawler at work shall carry on one of her masts two lights in a vertical line one over the other, not less than three feet apart, the upper light red, and the lower green, and shall also either carry the side lights required for other vessels, or, if the side lights cannot be carried, have ready at hand the coloured lights as provided in Article 7, or a lantern with a red and a green glass as described in paragraph (*a.*) of this Article.

(*e.*) Fishing vessels and open boats shall not be prevented from using a flare-up in addition, if they desire to do so.

(*f.*) The lights mentioned in this Article are substituted for those mentioned in the 12th, 13th, and 14th Articles of the Convention between France and England scheduled to the British Sea Fisheries Act, 1868.

(*g.*) All lights required by this Article, except side lights, shall be in globular lanterns so constructed as to show all round the horizon.

Art. 11. A ship which is being overtaken by another shall show from her stern to such last-mentioned ship a white light or a flare-up light.

Sound Signals for Fog, &c.

Art. 12. A steam ship shall be provided with a steam whistle or other efficient steam sound signal, so placed that the sound may not be intercepted by any obstructions, and with an efficient fog horn to be sounded by a bellows or other mechanical means, and also with an efficient bell. A sailing ship shall be provided with a similar fog horn and bell.

In fog, mist. or falling snow, whether by day or night, the signals described in this Article shall be used as follows; that is to say:—

(*a.*) A steam ship under way shall make with her steam whistle, or other steam sound signal, at intervals of not more than two minutes, a prolonged blast.

(*b.*) A sailing ship under way shall make with her fog horn, at intervals of not more than two minutes, when on the starboard tack one blast, when on the port tack two blasts in succession, and when with the wind abaft the beam three blasts in succession.

(*c.*) A steamship and a sailing ship, when not under way, shall, at intervals of not more than two minutes, ring the bell.

Speed of Ships to be Moderate in Fog, &c.

Art. 13. Every ship, whether a sailing ship or a steam ship, shall, in a fog, mist, or falling snow, go at a moderate speed.

Steering and Sailing Rules.

Art. 14. When two sailing ships are approaching one another, so as to involve risk of collision, one of them shall keep out of the way of the other, as follows, viz.:—

(*a.*) A ship which is running free shall keep out of the way of a ship which is close-hauled.

(*b.*) A ship which is close-hauled on the port tack shall keep out of the way of a ship which is close-hauled on the starboard tack.

(*c.*) When both are running free with the wind on different sides, the ship which has the wind on the port side shall keep out of the way of the other.

(*d.*) When both are running free with the wind on the same side, the ship which is to windward shall keep out of the way of the ship which is leeward.

(*e.*) A ship which has the wind aft shall keep out of the way of the other ship.

Art. 15. If two ships under steam are meeting end on, or nearly end on, so as to involve risk of collision, each shall alter her course to starboard, so that each may pass on the port side of the other.

This Article only applies to cases where ships are meeting end on, or nearly end on, in such a manner as to involve risk of collision, and does not apply to two ships which must, if both keep on their respective courses, pass clear of each other.

The only cases to which it does apply are, when each of the two ships is end on, or nearly end on, to the other; in other words, to cases in which, by day, each ship sees the masts of the other in a line, or nearly in a line, with her own; and by night, to cases in which each ship is in such a position as to see both the side lights of the other.

It does not apply by day, to cases in which a ship sees another ahead crossing her own course; or by night, to cases where the red light of one ship is opposed to the red light of the other, or where the green light of one ship is opposed to the green light of the other, or where a red light without a green light, or a green light without a red light, is seen ahead, or where both green and red lights are seen anywhere but ahead.

Art. 16. If two ships under steam are crossing, so as to involve risk of collision, the ship which has the other on her own starboard side shall keep out of the way of the other.

Art. 17. If two ships, one of which is a sailing ship, and the other a steam ship, are proceeding in such directions as to involve risk of collision, the steam ship shall keep out of the way of the sailing ship.

Art. 18. Every steam ship, when approaching another ship, so as to involve risk of collision, shall slacken her speed, or stop and reverse, if necessary.

Art. 19. In taking any course authorised or required by these Regulations, a steam ship under way may indicate that course to any other ship which she has in sight by the following signals on her steam whistle, viz.:—

One short blast to mean "I am directing my course to starboard:"
Two short blasts to mean "I am directing my course to port:"
Three short blasts to mean "I am going full speed astern."

The use of these signals is optional; but if they are used, the course of the ship must be in accordance with the signal made.

Art. 20. Notwithstanding anything contained in any preceding Article, every ship, whether a sailing ship or a steam ship, overtaking any other, shall keep out of the way of the overtaken ship.

Art. 21. In narrow channels every steam ship shall, when it is safe and practicable, keep to that side of the fairway or mid-channel which lies on the starboard side of such ship.

Art. 22. Where by the above rules one of two ships is to keep out of the way, the other shall keep her course.

Art. 23. In obeying and construing these rules, due regard shall be had to all dangers of navigation; and to any special circumstances which may render a departure from the above rules necessary in order to avoid immediate danger.

No Ship, under any Circumstances, to neglect proper Precautions.

Art. 24. Nothing in these rules shall exonerate any ship, or the owner, or master, or crew thereof, from the consequences of any neglect to carry lights or signals, or of any neglect to keep a proper look-out, or of the neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case.

Reservation of Rules for Harbour and Inland Navigation.

Art. 25. Nothing in these rules shall interfere with the operation of a special rule, duly made by local authority, relative to the navigation of any harbour, river, or inland navigation.

Special Lights for Squadrons and Convoys.

Art 26. Nothing in these rules shall interfere with the operation of any special rules made by the Government of any nation with respect to additional station and signal lights for two or more ships of war or for ships sailing under convoy.

EXERCISES IN THE RULE OF THE ROAD.

Q. When, by the Rules, one of two ships has to keep out of the way, what has the other to do?

A. Keep her course.

Q. Any qualification or exception to this?

A. Due regard must be had to all dangers of navigation, and to any special circumstances which may exist in any particular case.

Q. What general direction is there in the steering and sailing rules?

A. Nothing in the rules shall exonerate any ship, owner, master, or crew, from the consequences of any neglect to carry lights or signals, or neglect to keep a proper look-out, or neglect of any precaution which may be required by the ordinary practice of seamen, or by the special circumstances of the case.

Q. What does the Act of Parliament provide as the obligation of owners and masters in obeying the regulations respecting lights, fog signals, and steering and sailing rules?

A. It provides that they shall obey the regulations. And also in case of default, they shall be guilty of a misdemeanour.

Q. What do breaches of the regulations imply?

A. Wilful default of the person in charge of the deck, unless special circumstances made the breaches necessary.

Q. If collisions ensue from a breach of the regulations, who is to be deemed in fault?

A. The person by whom the breach of the regulation is made.

Q. In case of collision what would you do ?

A. Get clear as soon as possible, ascertain what damage I had received, and whether the ship was making water.

Q. What next ?

A. Give what assistance I could to the other ship. Give her my ship's name and port of registry. Have all the crew as witnesses. Ask her name and port of registry.

Q. Is one ship bound to assist another in case of collision ?

A. Yes ; without there is a reasonable excuse.

Q. What is the penalty you will suffer for default when you have charge of the deck ?

A. The collision is to be deemed to be caused by me.

Q. Is there any other penalty attaches to not rendering assistance ?

A. My certificate may be suspended, or cancelled.

Q. Should you understand the regulations before you take charge of the deck of a ship ?

A. I should ; for if I do not, and am guilty of default, the consequences may be very serious both to me and other people.

Q. Do the regulations apply to sea-going ships in harbours and in rivers ?

A. Yes ; unless there is a rule to the contrary made by a competent authority.

Q. Do they apply to British ships only ?

A. They apply to foreign ships also.

Remarks.—The Examiner has models of sailing ships, steamers, and lights, which he places in different positions, and asks the Candidate how he would act if he were in one of those ships ?

The Candidate will find it very instructive to practise the following exercises with models, lights, and a compass.

SAILING SHIPS.

Q. You are free and have the wind on your starboard side, you see a sailing ship's red light on your starboard side ; which ship keeps out of the way of the other ?

A. The other ship keeps out of my way.

Q. Why.

A. The other ship *may* have the wind on the same side, and is therefore to windward, and she "*shall keep out of the way*," Art. 14, (*d.*) She *may* have the wind aft, and therefore she "*she shall keep out of the way*," Art. 14, (*e.*) Or, she *may* have the wind on her port side, and therefore she "*shall keep out of the way*," Art. 14, (*c.*)

Q. You are free, and have the wind on your starboard, and you see a sailing ship's green light on your port side ; which ship keeps out of the way ?

A. I keep out of the way of the other ship.

Q. Why?

A. I may have the wind on the same side, and I "*shall keep out of the way,*" Art. 14, (*d.*) I may have the wind aft, and I "*shall keep out of the way,*" Art. 14, (*e.*) Or, I may have the wind on the port side, *and I shall* keep out of the way, Art. 14, (*c.*)

Q. You are close hauled and have the wind on your starboard side, you see a sailing ship's red light on your starboard side?

A. If the other ship be free, she "*shall keep out of the way,*" Art. 14, (*a.*) I "*shall keep*" my "*course,*" Art. 22.

If the other ship be close hauled; the new rules are silent as to this particular case, except so far as Articles 23 and 24 may bear on it; but by the old rule, Art. 12, "*if they have the wind on the same side . . . . the ship which is to windward shall keep out of the way.*"

Q. You are close hauled on the starboard tack, you see a sailing ship's green light on your port bow?

A. The other ship is on the port tack, either close hauled or free, and "*shall keep out of the way,*" Art. 14, (*a*), (*b*).

Q. You have the wind on your starboard beam, you see the red and green lights of a sailing ship right a-head; which ship keeps out of the way?

A. The other ship "*shall keep out of the way,*" Art. 14, (*c.*)

Q. What was the old rule in this case?

A. By the old Art. 11, both ships port.

Q. You are free, and have the wind on your port side, you see a sailing ship's green light on your port side; which ship keeps out of the way?

A. The other ship may have the wind on the same side, and she "*shall keep out of the way,*" Art. 14, (*d*). She may have the wind aft, and she "*shall keep out of the way,*" Art. 14, (*e*). Or, she may have the wind on a different side, and I "*shall keep out of the way,*" Art. 14, (*c.*)

Q. You have the wind on your port beam, you see the red and green lights of a sailing ship right ahead; what will you do?

A. I "shall keep out of the way," Art. 14, (*c*).

Q. You are close hauled on the starboard tack, it is a fog, mist, or falling snow, so that you see no other ship; you have been sounding one blast on your fog horn at intervals of not more than two minutes, you do not hear any other fog horn, or other signal, you tack ship; when you come nearly head to wind, you suddenly see a sailing ship's red light on your starboard bow; what will you do?

A. Haul all my yards a-back. Arts. 23 and 25.

Q. You are similarly situated on the port tack, and suddenly see a green light on your port bow?

A. Haul all my yards a-back.

STEAMERS AND SAILING SHIPS.

Q. *You are in a Steamer*, you see a sailing ship's red light on your port bow?

A. Keep my course. See Gray's rhyme.

Q. You see a sailing ship's green light on your starboard bow?

A. Keep my course. See Gray's rhyme.

Q. You see a sailing ship's red light on your starboard bow?

A. I "*keep out of the way.*" Art. 17.

Q. You see a sailing ship's green light on your port bow?

A. I "*keep out of the way.*" Art. 17.

Q. You see both side lights of a sailing ship right a-head?

A. I "*keep out of the way.*" Art. 17.

Q. You see a ship's regulation lights right astern, she is overtaking you?

A. I shew a white light, or a flare-up light, from my stern. Art. 11.

STEAMERS.

Q. *You are in a Steamer.* You see a steamer's red light on your port bow?

A. I keep my course. Repeat Gray's rhyme for the case.

Q. You see a steamer's green light on your starboard bow?

A. I keep my course. Repeat Gray's rhyme.

Q. You see a steamer's red light on your starboard bow?

A. I "*keep out of the way.*" Art. 16. Repeat the proper rhyme.

Q. You see a steamer's green light on your port bow?

A. I "*keep my course*" with caution. Art. 22. Repeat the proper rhyme.

Q. You see all three lights of a steamer right a-head, or nearly so?

A. I "*alter*" my "*course to starboard.*" Art. 15. Repeat the proper rhyme.

Q. It is a fog, mist, or falling snow, you suddenly see another ship in such a position, that there is danger of a collision; what would you do?

A. I would do whatever was most likely to avoid collision. If I directed my course to starboard, I would give one short blast on my steam whistle; if to port, two short blasts; and if to full speed astern, three short blasts.

Q. You suddenly see a steamer's red light on your starboard bow, and another steamer's green light on your port bow; what would you do?

A. Ease, stop, and reverse; give three short blasts on my steam whistle.

Q. Which side of a river must a steamer keep ?

A. Her own starboard side of mid channel.

Q. You are taking the bearing of a coloured light, belonging to either a steamer or sailing ship, give a general rule for finding the 10 points within which that ship must be steering ?

A. I would conceive myself to be at the centre of the compass and looking towards the light; then:

Rule for a Green light. She ship carrying a Green light is steering between nearly the opposite point of the bearing of the light, and six points to the right hand of the bearing.

Rule for a Red light. The ship carrying a Red light is steering between nearly opposite point to the bearing of the light, and six points to the left hand of the bearing.

These rules may be concisely expressed thus: Green between nearly opposite and six points to right. Red between nearly opposite and six points to left.

Q. You are steering North, a green light is 2 points on your starboard bow; how is the ship carrying that light steering ?

A. Between SSW nearly and E.

Q. Why so ?

A. Because, if the other ship's screens be properly fitted, these are the only 10 points in which her green light can be seen when it is 2 points on my starboard bow and I am steering North.

Q. You are still steering North, a red light is 2 points on your starboard bow; how is the ship carrying that light steering ?

A. Retween SSW nearly and NW.

Q. Why so ?

A. Because, if the other ship's screens be properly fitted, these are the only 10 points in which her red light can be seen when it is 2 points on my starboard bow and I am steering North.

Q. You are steering north, a green light is 2 points on your port bow ?

A. The other ship is steering between SSE nearly and NE.

Q. You are steering North, a red light is 2 points on your port bow ?

A. The other ship is steering between SSE nearly and W.

TABLE SHEWING HOW A SHIP WITH A COLOURED LIGHT VISIBLE IS STEERING.

Green Light.	Red Light.	Bearing of Light.		Red Light.	Green Light.
W S W.	E S E.	N.	S.	W N W.	E N E.
W by S.	SE by E.	N by E.	S by W.	NW by W.	E by N.
W.	S E.	N N E.	S S W.	N W.	E.
W by N.	SE by S.	NE by N.	SW by S.	NW by N.	E by S.
W N W.	S S E.	N E.	S W.	N N W.	E S E.
NW by W.	S by E.	NE by E.	SW by W.	N by W.	SE by E.
N W.	S.	E N E.	W S W.	N.	S E.
NW by N.	S by W.	E by N.	W by S.	N by E.	SE by S.
N N W.	S S W.	E.	W.	N N E.	S S E.
N by W.	SW by S.	E by S.	W by N.	NE by N.	S by E.
N.	S. W.	E S E.	W N W.	N E.	S.
N by E.	SW by W.	SE by E.	NW by W.	NE by E.	S by W.
N N E.	W S W	S E.	N W.	E N E.	S S W.
NE by N.	W by S.	SE by S.	NW by N.	E by N.	SW by S.
N E.	W.	S S E.	N N W.	E.	S. W.
NE by E.	W by N.	S by E.	N by W.	E by S.	SW by W.

To use the preceding Table.

Suppose a Red light be seen bearing N; then by the table the other ship is steering between S and WNW. If the Green light be seen bearing N, then the other ship is steering between S and ENE.

Again. If the red light bear S, the other ship is steering between N and ESE.

If the green light bear S, the other ship is steering between N and WSW.

Q. You see either a steamer or a sailing ship's red light on your starboard bow, anywhere between right ahead and two points before your beam. It continues on the same bearing?

A. There will be a collision.

Q. Why so?

A. Because the ships are crossing and closing.

Q. The red light draws more ahead?

A. The other ship will likely cross ahead of me?

Q. The red light draws more astern?

A. I will likely cross ahead of the other ship.

Q. You see a green light on your port bow, anywhere between right ahead and two points before your beam. It continues on the same bearing?

A. There will be a collision.

Q. Why so ?

A. Because the ships are crossing and closing.

Q. The green light draws more ahead ?

A. The other ship will likely cross ahead of me.

Q. The green light draws more astern ?

A. I will likely cross ahead of the other ship.

Exercises on Article 14.

Q. You have charge of the deck of a sailing ship ; it is night time, dark, hazy, strong tide with you, meeting a fleet of both steamers and sailing ships, and passing a fleet of ships at anchor ?

A. Have the ship under such sail, that she is under perfect command, and can be quickly brought to the wind without any risk of damage.

Q. You meet a fleet of steamers ?

A. Keep my course. Art. 17.

Q. Any exception to this ?

A. Yes. By Art. 23. Due regard must be had to all dangers of navigation, and due regard must be had to any special circumstances which may exist in any particular case, rendering a departure from the above rules necessary, in order to avoid immediate danger.

Q. A steamer thinks he can cross you, but when it is too late to go under your stern, he finds he cannot do so, can you do anything to avoid collision ?

A. Yes. Hard a port or hard a starboard. Show Green to Green ; or, Red to Red, or heave my ship into the wind, as the case may require.

Q. You meet a fleet of sailing ships ?

A. Consider what those sailing ships can do, and what they probably will do in the various cases that may occur.

Q. You see a white light ?

A. Probably a ship at anchor ; if so, keep clear. It may be the mast head light of a steamer, with coloured lights invisible ; or it may be a pilot cutter's light.

Q. You are running; a fleet of sailing ships are coming the other way ?

A. They must be turning. Keep clear. If not certain of crossing them, go under their stern. Show Green to Green ; or, Red to Red, as the case may require.

Q. You think you will cross the bow of a green light on your port bow ; but when it is too late to go under his stern, you find you cannot cross him ?

A. Hard a port, foreyard forward, let him pass to leeward of me.

Q. You see a red light anywhere on your port side ?

A. Red to Red. Go ahead.

Q. You see a green light anywhere on your starboard side ?

A. Green to Green. Go ahead.

Q. What position of the Green or Red shews danger ?

A. Green to port or Red to starboard shews danger.

Q. A is a sailing ship, close hauled on port tack ; B is a sailing ship close hauled on starboard tack ?

A. A, being on port tack, gives way. Art 14.

Q. A is free. B close hauled ?

A. A gives way. Art. 14.

Q. A is close hauled. B is free.

A. B gives way. Art 14.

Q. Both ships free. A wind on port side. B on starboard side ?

A. A gives way. Art 14.

Q. Both ships on same tack. A to windward ?

A. A keeps clear. Art. 14.

Q. A has the wind aft. B has it on the beam ?

A. A keeps clear.

Q. A is on port tack, B on starboard tack, both close-hauled. How does A know that she shall weather B ?

A. By taking a mark ahead of B.
If the mark open by B, A will weather B. If it close, or do not open, A will not weather B.

Q. A thinks that she will weather B ; but, when it is too late to give way, finds that she cannot. What must both ships do ?

A. Both tack ship.

Q. Night time. A and B are turning. A on port tack sees B's red light on starboard tack. How does A know that she will weather B ?

A. By A taking the bearing of B.
If B's bearing draw more astern, A will weather B.
If B's bearing do not alter, or it draw more ahead, A will not weather B.

Q. A is close-hauled, wind or port side, and sees B's red light on her starboard side ?

A. If B's red light be anywhere between 2 points before the beam and aft, B must have the wind on her port side, A is to windward, and by Art 14 " shall keep out of the way."
If B's red light be anywhere between 2 points before the beam and right ahead, then B must either have the wind on the starboard side,

and likely close-hauled, or be in stays, and by Art. 14 A "shall keep out of the way." B may be nearly ahead *and free*, then B keeps clear.

Q. A is still close-hauled, wind on port side, and sees B's green light on her port side?

A. If B's green light be anywhere between aft and 2 points before the beam, she must have the wind on her port side and may be either close-hauled or free, in either case by Art. 14 A "shall keep out of the way."

If B's green light be anywhere between 2 points before the beam and right ahead, she must have the wind free, and by Art 14 "shall keep out of the way."

Short answer. *B keeps clear.*

Q. A is free, wind on port side, and sees B's red light on her starboard side, abaft the beam, abeam, or before the beam?

A. In all these positions of the red light, B may be, either free, then A is to windward, or B. may be close hauled, and A is free; hence by Art 14 A "shall keep out of the way."

Short answer. *A keeps clear.*

Q. A is free, wind on port side, and sees B's green light on her port side?

A. B may be close-hauled, and wind on starboard side; then *A keeps clear.*

Or B may be free, with wind on starboard side; then *A keeps clear.*

Or B may have the wind on her port side, and, being to windward, *she keeps clear.*

Q. A is close-hauled, wind on starboard side, and sees B's green light on her port side, abaft the beam, abeam, or before the beam?

A. When B's green light is abaft the beam, or abeam, she must have the wind on the starboard side, and A, being to windward, *keeps clear.*

When B's green light is before the beam, she must either have the wind on the port side and *keep clear*, or she may be in stays, and A must *keep clear.*

Q. A is close hauled, wind on starboard side, and see B's red light on her starboard side abaft the beam, abeam, or before the beam?

A. When B's red light is abaft the beam, or abeam, she must have the wind on her starboard side, and may be either free, or close hauled, and, being to windward, in either case shall "keep out of the way."

If A's red light be before the beam, she must be free, and may have the wind on either side, and shall "keep out of the way."

Short answer. *B keeps clear.*

Q. A is free, wind on starboard side, and sees B's green light on her port side, abaft the beam, abeam, or before the beam?

A. B in general must have the wind on her starboard side, and may be either free or close hauled, *A keeps clear.*

Q. A is free, wind on starboard side, and sees B's red light on her starboard side, abaft the beam, abeam, or before the beam ?

A. B. may have the wind on either the starboard side, or the port, side, and in each case, *keep clear.*

NOTE.—The author again strongly recommends Candidates to place models of ships in different positions so as to be able to give intelligent answers to the Examiner.

Q. There are two sailing vessels close hauled, one has the wind on the port side, a shoal is on her lee bow, and she cannot go about, the other has the wind on the starboard side. What must be done, and what article has reference to this case ?

A. The ship with the wind on the starboard side must keep clear. Article 23.

Q. The wind has been on your starboard side, you are in the act of tacking ship, you suddenly see a red light on your starboard side, the ship keeps falling off and there is likely to be a collision ; what would you do ?

A. Haul the yards all aback.

SHORT RULES FOR WIND ON PORT SIDE.

Q. You see both red and green lights ahead ?

A. *Port ;* except the other ship be in stays, then *keep clear.*

Q. You see a red light on your starboard side ?

A. *Keep clear* ; except the other ship be free, *keep my course.* If I cannot make out whether he be free or close hauled, *tack ship.*

Q. You see a green light on your port side ?

A. When close hauled *keep my course.* When free, *keep clear* ; except the other ship have the wind on her port side, then *keep my course.*

SHORT RULES FOR WIND ON STARBOARD SIDE.

Q. You see both red and green lights ahead ?

A. *Keep my course ;* except the other ship be in stays, then *keep clear.*

Q. You see a red light on your starboard side ?

A. *Keep my course ;* except the other ship be close hauled, then *keep clear.*

Q. You see a green light on your port side ?

A. *Keep clear ;* except my ship be close hauled, and the other also be close hauled, with the wind on her port side, then *keeep my course.*

THE ACTIONS OF THE REVERSED SCREW.

(RIGHT HANDED).

Results of experiments made on board the screw steamer "Tabor," of Sunderland, on Tuesday the 19th day of February, 1878, off the Tyne, in the presence, amongst others, of the following nautical gentlemen :—Rear-Admiral R. A. Powell, C.B., Captain Nicholas, Nautical

Assessors of the Board of Trade; Captain John Gillie and Captain W. G. Tate, Examiners of the Tyne and Wear Local Marine Boards; Captain James Henderson, Secretary to the British Shipmasters' and Officers' Protection Society; Captain Magnus Mail, Ship's Husband, and Captain Wardell Mankin, mastor of the "Tabor," and a number of other gentlemen.

CONDITIONS.

The "Tabor" is a screw steamer of 520 tons register. She has two high-pressed surface condensing engines of 90 horse power. Her screw is right-handed and has four blades tapered at the tops. Here length is 208 feet, and her breadth amidships is 27 feet 8 inches. The "Tabor" on the said 19th day of February was in water ballast, drawing six feet six inches forward, and ten feet 3 inches aft. The wind was blowing a moderate breeze from the S. by W. ½ W. The ship exposed about 12 feet of her bows to the face of the wind. The course on which all the experiments were tried was W.S.W. The steamer was going between 7 and 8 knots an hour. All orders were executed within eight to ten seconds.

No. 1. Stopped; reversed screw; helm put hard to starboard. In 1½ minutes the ship's head had gone off 3 points to starboard. In 2¾ minutes her head had gone off 6 points to starboard, and the ship had then lost her way. Fore and main trysails set.

No. 2. Stopped; reversed screw; helm put hard to port. In 1½ minutes the ship's head had gone off 2 points to starboard. In 2¾ minutes her head had gone off 3¾ points to starboard, and the ship had then lost way. Fore and main trysails set.

No. 3. Stopped; reversed screw; helm amidships. In 1½ minutes the ship's head had gone off 4½ points to starboard, and in 2¾ minutes her head had gone off 7 points to starboard, and the ship then lost her way. No sail was set.

No. 4. Stopped; reversed screw; helm put hard to starboard. In 1½ minutes the ship's head had gone off 4 points to starboard, and in 2¾ minutes her head had gone off 6 points to starboard, and the ship had then lost way. No sail was set.

No. 5. Stopped; reversed screw; helm put hard to port. In 1½ minutes the ship's head had gone off 3 points to starboard. In 2 minutes and 25 seconds her head had gone off 4 points, and the ship had then lost way. No sail was set.

COMMERCIAL CODE OF SIGNALS.

REMARKS.—The Examiner may lay the flags on the table, or in a frame against the wall, so as to form signals, and then ask the Candidate what kind of signals they are. He may then point to the flags separately and ask their name. He may ask him to find a signal in the signal book. Or, he may write a sentence on a piece of paper and require him to write his answer.

Q. How many Code Signals are there ?

A. 18, and in addition a Code Pennant.

Q. What kind are they ?

A. 1 Burgee, 4 pennants and 13 square flags.

Q. Name them, or point them out ?

A. B is the *Burgee.*
C ,, Clear (or White) Pennant.
D ,, Dark (or Blue) ,,
F ,, Fiery (or Red) ,,
G, H, J, K, L, M, N } must be learnt by heart.
P ,, Peter.
Q ,, Quarantine. Yellow Flag.
R ,, Red (Cross).
S ,, Spot White.
T ,, Tricolor.
V, W } must be remembered.

Q. Where is the signal hoisted ?

A. Where best seen.

Q. What is the code signal for ?

A. It is shewn under the ensign whilst signalling, to indicate that the signal is by the commercial code ; hoisted by itself it is the answering pennant.

ONE-FLAG SIGNALS.

Q. What does the pennant C mean when it is hoisted by itself ?

A. Yes.

Q. What is the meaning of the pennant D by itself ?

A. No.

TWO-FLAG SIGNALS.

Q. Two flags. Burgee uppermost.

A. Attention signal.

Q. Two flags. Pennant uppermost ?

A. Compass signal.

Q. Two flags. Pennant uppermost. Flag W undermost ?

A. Meteorological forecast.

Q. Two flags. Square flag uppermost ?

A. Urgent, or Danger Signal.

THREE-FLAG SIGNALS.

Q. Three flags.

A. Universal; and express Latitude, Longitude, Time, Numeral, and all ordinary signals, required for communication.

FOUR-FLAG SIGNALS.

Q. Four flags. Burgee uppermost.

A. Geographical signal.

Q. Four flags. Pennant, C, D, or F uppermost ?

A. National vocabulary and spelling table.

Q. Four flags. Pennant G uppermost ?

A. Name of Man of War.

Q. Four flags. Square flag uppermost ?

A. Name of Merchant Ship.

REMARKS.—The outside edges of the leaves of the Code Signal Book, are coloured Red, Blue, and then Red again. The first Red denotes Part I, the Blue denotes Part II., and second Red denotes Part III and IV.

TO INTERPRET THE SIGNALS IN THE PLATE.

Q. The ship hoists the signal BF, interpret it.

A. In page 1, of Part II., the words "vessel just arrived, show your distinguishing signals" are in the same line with the signal letters BF. Those words are the interpretation of the signal. The interpretation of any other signal is found in a similar manner.

TO MAKE A SIGNAL.

Q. Make the signal for "Cut away your masts."

A. Cut is the principle word in the preceding sentence. It is found in Part II, page 50, and the signal letters LW, are at the right side of the sentence.

The signals letters for to make any other signal may be found in a similar manner.

INTERPRET THE SIGNALS IN THE PLATE.

Signals.		Interpretation.	Part.		Page
BF	.....	Vessels just arrived show your distinguishing signals.	I	.....	1
CR	.....	ENE.	I	.....	1
HF	.....	We are coming to your assistance.	I	.....	2
MQ	.....	Look out for a line.	I	.....	3
LVT	.....	Do you know the Pilotage.	I	.....	46
MHR	.....	Bear up.	I	.....	47
WNP	.....	8400.	I	.....	74
WTS	.....	Q.	I	.....	75
BGRS	.....	Bilboa.	I	.....	88
CFWB	.....	Why ?	II	.....	7
WFSD	.....	Erato of London.	IV	.....	107
GSLC	.....	Lively, Paddle.	IV	.....	XVII.

MAKE THE SIGNALS FOR THE FOLLOWING SENTENCES AND PHRASES.

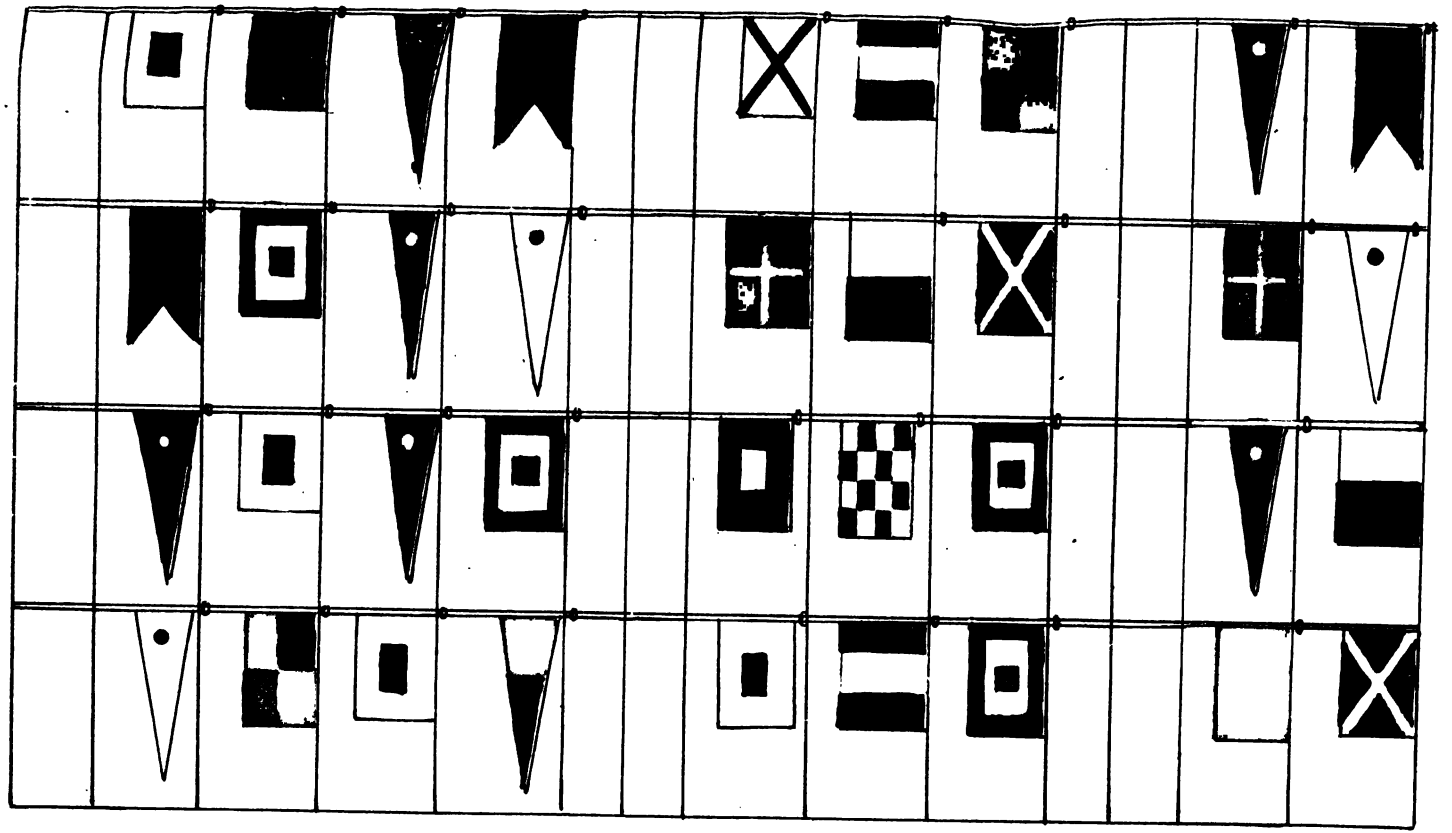
Sentences, &c.	Signals.			
Spell your own name.		II	.....	2
Vessels just weighed show your distinguished Signals.	BG	I	.....	1
SSE.	DR	I	.....	1
Cut away your masts.	LW	II	.....	50
Have you a spare code of signals.	CVK	II	.....	141
Good accommodation.	DQR	II	.....	10
Give your orders.	PNK	II	.....	110
When did it happen.	QVW	II	.....	77
High water.	MJP	II	.....	80
Plenty of water.	LRB	II	.....	144
More rain than wind.	HNJ	II	.....	169
Can I land my invalids.	DTH	II	.....	87
Are you on fire.	BHR	II	.....	67
Cat the Anchor.	CNLR	II	.....	87

GEOGRAPHICAL SIGNALS, MEN OF WAR, AND MERCHANT SHIPS' NAMES.

Mount's Bay.	BDTR	II	.....	190
BDTR	Mount's Bay.	I	.....	84
GSVL	Opal, Screw.	IV	.....	XVIII
PJVG	Messenger of Shields.	IV	.....	58

Q. Spell John Harrison's name ?

A.	CDJR	.....	Joh
	WTP	.....	n
	WVL	.....	Finish of Word.
	CBWQ	.....	Har
	CFJK	.....	ris
	CDVN	.....	on
	WVL	.....	Finish of Word.



INTERPRET THE FOLLOWING SIGNALS.

Signals.	Interpretation.	Part.	Page.
BV	Calls the the attention of the vessel leaving the anchorage.	I	1
GS	N by W ½ W.	I	1
LV	Shift your berth; your berth is unsafe.	I	3
NJ	I am driving; no more anchors to let go.	I	3
CWM	Fire a signal gun.	I	15
CVB	Stranger is gaining.	I	14
LRM	I will carry a light.	I	45
WVC	T.	I	75
BJCG	Corinth.	I	90
CVBG	If we separate we may have a chance of escape.	II	63
QNVD	Sederia of Galle.	IV	71
GTBQ	Pembroke; reserve ship.	IV	XVIII
FW	Meteorological report for to-day gives "winds variable" between the points indicated.	I	1
BNQC	Guatemala.	I	99

MAKE THE SIGNALS FOR THE FOLLOWING SENTENCES.

Sentences, &c.	Signals.		
Guatemala.	BNQC	II	184
Pembroke, Man of War	GTBQ	IV	XVIII
I don't think they will.	VKP	II	168
Put to sea at one; get an offing.	LS	II	184
Main mast damaged.	DJHS	II	98
All included.	PLR	II	84
What distance were you.	MQN	II	56
Want a cable and anchor.	PL	II	84
Is the appointment settled.	CJNP	II	18
Bowsprit sprung.	CMDG	II	31
My Greenwich mean time is.	GRK	II	75
Lay out an anchor.	LHP	II	91
Will you repeat my signals.	CVS	II	127
Is the cargo sold.	NKD	II	143
Heavy falls of Snow.	HRC	II	143
Passengers must be landed.	DLR	II	50
Use every precaution.	DNQL	II	119
What are you waiting for?	QWG	II	163
What weather have you had?	HMK	II	165
Pieces of wreck have been picked up?	BLG	II	170
Have you had an offer?	DLPR	II	108
What is the matter?	QVS	II	99
Keep close during the fog.	HNT	II	69
Where is the Captain?	DHF	II	35
Breakfast before you start.	CMGF	II	31
Account sent is incorrect.	CHGW	II	10
I will take her in tow.	KRQ	II	157
The decision is final.	CWDB	II	67
I will pay you a visit.	FCRQ	II	163
Lay out an anchor.	LHP	II	16

Q. How can you tell the quadrants of the compass by any particular characteristic in the hoist?

A. From N to E¼N the C pennant is uppermost.
,, E ,, S¼E ,, D ,, ,,
,, S ,, W¼S ,, F ,, ,,
,, W ,, N¼W ,, G ,, ,,

Q. What is the meaning of a two-flag signal, pennant uppermost, flag W below?

A. Meteorological forecast.

Q. What flag in the spelling table is common to every syllable?

A. Pennant C uppermost.

Q. How is the commercial code applied in making boat signals?

A. The distant signals are used.
The signals are *made from right to left*, and *read from left to right.*

Q. You have no distant signals?

A. Take handkerchiefs, square pieces of canvas, or deals for square flags. Narrow strips of canvas or other material for pennants; and hats, buckets, or corkfenders for balls.

Q. What means are there for reporting ships passing along the English coast?

A. Ships hoisting their names according to the code will be reported to the *Shipping Gazette.*

Q. How are signal letters for reporting a ship's name to be obtained?

A. By applying to a Registrar of Shipping at one of the Custom Houses; or, the Registrar General of Seamen in London.

DISTANT SIGNALS.

A Code of Distant Signals has been introduced into the Commercial Code Signal Book, to communicate at sea when distance or haze prevent the Signal Flags being made out.

The *characteristic* of the Distant Signal is the *Ball*—one Ball at least appearing in every Hoist of the Distant Code. With respect to the two other Symbols, they may be Pennants or Flags of any Colour, that is to say, any of the Code Pennants or Code Flags may be employed irrespective of their Colour. It will be seen from the Plate of Distant Signals that the Code has been so arranged as to give the least possible trouble in finding the combination required; thus—

The *First* Column contains all the combinations having the *Ball* or *Balls first* or *uppermost* in the Hoist.

The *Second* Column contains all the combinations having the *Ball* or *Balls second* or *separated* in the Hoist.

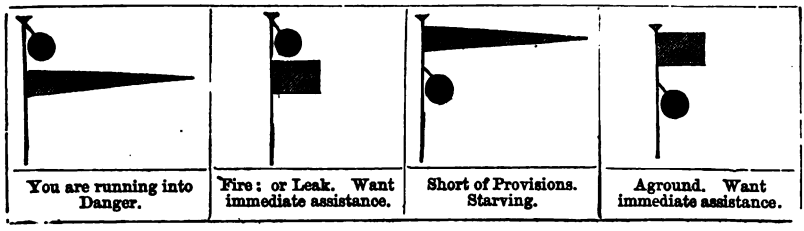
The *Third* Column contains all the combinations having the *Ball* or *Balls last* or *lowermost* in the Hoist.

These Signals are only used when distance or haze prevents the distinguishing of the *Colours* of the Flags.

SIGNIFICATIONS of the DISTANT SIGNALS when made *singly*, which will be indicated by the "*stop*" following each Hoist.

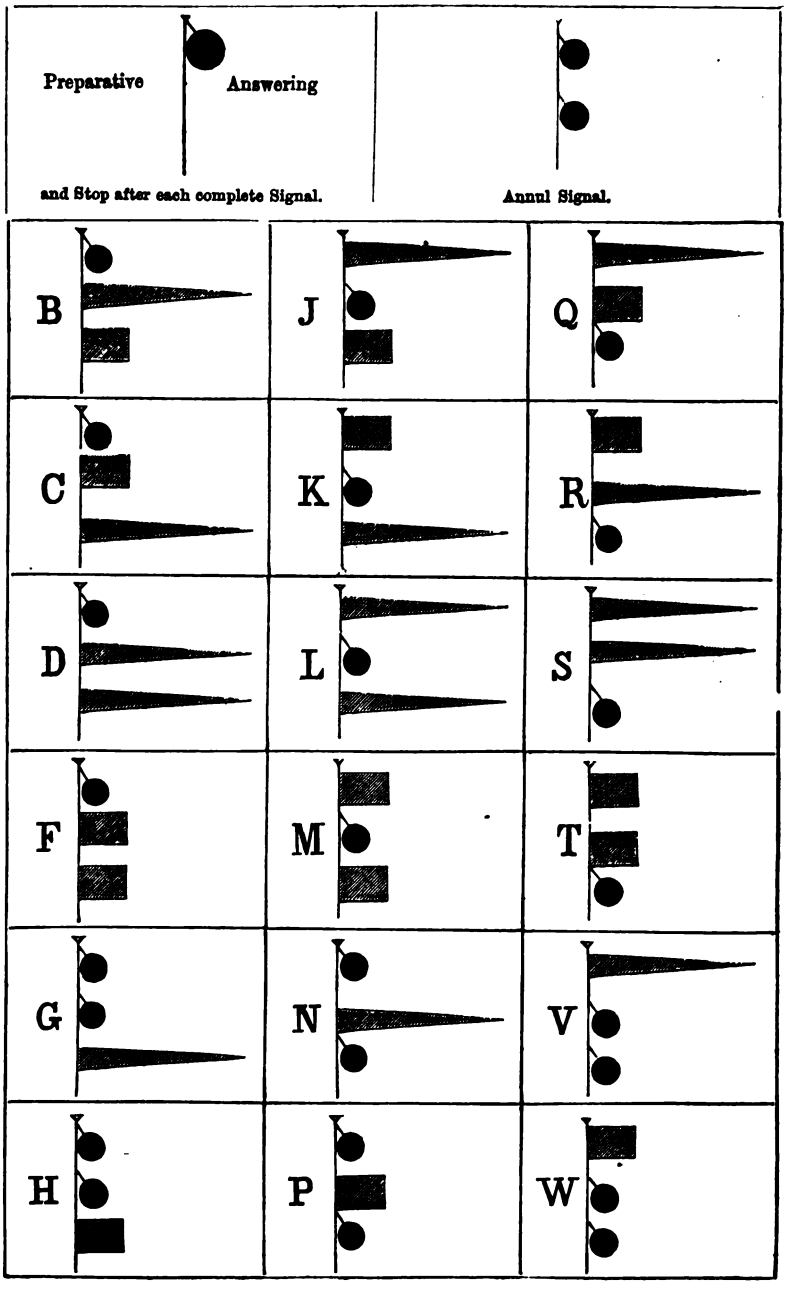
B. Asks Name of Ship or Signal Station in sight.
C. Yes.
D. No.
F. Repeat Signal, or hoist it in a more conspicuous place.
G. Cannot distinguish your Flags. Come nearer, or make Distant Signals.
H. You may communicate by the Semaphore, if you please.
J. Stop, or bring to. Something important to communicate.
K. Have you any Telegrams or Despatches for me?
L. Want a Pilot. Can I have one?
M. Want a tug. Can I have one?
N. What is the Meteorological Weather Forecast?
P. Calls attention of Signal Station in sight.
Q. Vessel asks for orders by Telegraph from Owner, Mr.—— at——. *(See* QN, Part I, *and Instruction, thereto.)*
R. Report me by Telegraph to my Owner, Mr.—— at——. *(See* QN, Part I, *and Instructions thereto.)*
S. Send the following message by Telegraph.
T. Send the following message by the *Signal Letters*, through the Telegraph.
V. ——.
W. ——.

In addition to the above, the following Distant Signals composed of *Two Symbols* have the special signification indicated beneath.



You are running into Danger.	Fire: or Leak. Want immediate assistance.	Short of Provisions. Starving.	Aground. Want immediate assistance.

GENERAL ALPHABETIC TABLE FOR COMPOSING DISTANT SIGNALS.



SEMAPHORES.

The Semaphores, or Signal Stations, established on the coasts of France, have, wherever practicable, the means of intercommunication by Electro-Telegraphic Wires with each other, and with the chief Metropolitan, Provincial, and Foreign Telegraph Stations.

By the method hereafter described, passing vessels will be able to exchange communication with these Semaphores, and their messages will be received, and, if required, forwarded to their destination, according to the established Tariff of Rates.

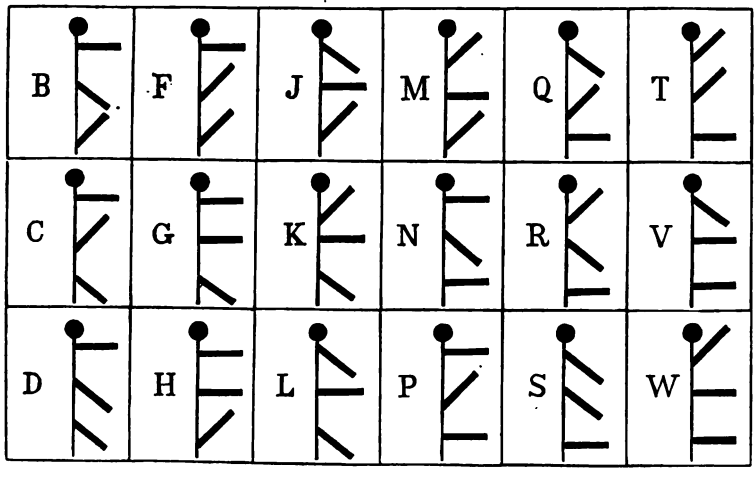
Although at present there are no similar facilities of communication placed at the service of Shipping frequenting the coasts of the United Kingdom, it is believed that should Signal Stations be heaeafter established, the French system affords the simplest means of signalling by Semaphore between the shore and ships in the offing at a distance whence the Colours of Flags would not be distinguishable.

At a moderate distance the Signal Flags of the Code can of course be used by both ships and signal stations, but the *Distance Signals* should on all occasions be employed by ships when it is foumd that the Code Flags cannot be made out.

The Semaphores are furnished with *Three Arms*. When at rest the arms are not visible. When at work the position of the arms in the three directions indicated in the plate (page 52), represents respectively the Three Symbols used in the Distant Signal Code.

The Semaphore Signals will, consequently, be always read off as Distant Signals, the position or direction of the arms indicating respectively the *Pennant*, the *Ball*, or the *Flag*.

ALPHABET FOR SEMAPHORE SIGNALS.



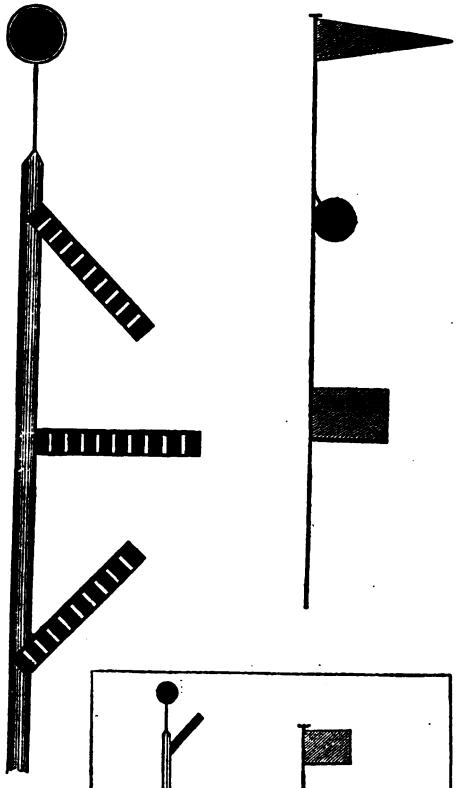
ADAPTATION OF THE FRENCH SEMAPHORIC SYSTEM TO THE COMMERCIAL CODE FOR MAKING DISTANT SIGNALS.

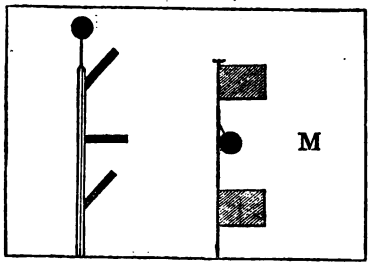
N.B.—The Disc at the top of the mast remains in the position indicated at the next page whilst Signals are being made by this Code.

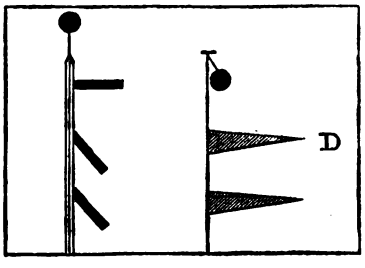
The arm in the position pointing *downwards* represents a PENNANT.

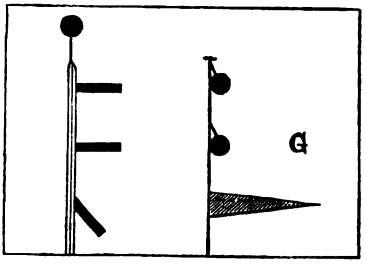
The arm in the *horizontal* position represents a BALL.

The arm in the position pointing *upwards* represents a FLAG.









EXAMPLES.—MDG. "Leave the Buoy or Beacon to Port.

BOAT SIGNALS.

The Symbols to be employed are—

1. Two square flags or pieces of cloth
2. Two whefts or strips of cloth
3. Two balls, bundles, or hats

} Of any colour.

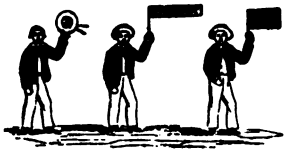
By means of the above Symbols, all the Signals of the *Distant Signal Code* may be made as shewn below. Handkerchiefs, Hats, Buckets, or Baskets may be used in making these signals; and if no mast, pole, or spar is handy, these signals can be made by holding the hat, bundle, or other symbol at arm's length. The Signals will be *made* from *right* to *left*, and be read off from *left to right*.

EXAMPLES.

or

Signifies: "You are running into danger."

1°. or J

2°.  or B

Signify: J B "Accident; want Surgeon."

3°. or

"Stop" or Finish after each complete Signal.

NOTE 1.—It is necessary, however, in using the proper means to attract attention, to avoid those which may occasion confusion.

NOTE 2.—The rule for making Boat Signals will, perhaps, be better understood, as follows:—

Boat Signals are made by the first man stretching his left arm out, the second man to stand at the left hand of the first, and so in order. The Signals are to be read in the same order as a person would read his own name.

EXTRACTS FROM THE MERCHANT SHIPPING ACT, 1876.

Cadidates will be questioned on the following subjects:

"The record of the draught of water of any sea-going ship required under section 5 of the Merchant Shipping Act, 1871, shall, in addition to the particulars thereby required, specify the extent of her clear side, in feet and inches.

"The term 'clear side' means the height from the water to the upper side of the plank of the deck from which the depth of hold as stated in the register is measured, and the measurement of the clear side is to be taken at the lowest part of the side.

"Every master of a sea-going ship shall, upon the request of any person appointed to record the ship's draught of water, permit such person to enter the ship and to make such inspections and take such measurements as may be requisite for the purpose of such record, and any master who fails so to do, or impedes, or suffers any one under his control to impede, any person so appointed in the execution of his duty, shall for each offence incur a penalty not exceeding £5.

"*Signals of Distress.*"

"*In the Daytime.*

"1. A minute gun;

"2. The *Code* signal N C;

"3. A square flag having either above, or below it, a ball.

"*At Night.*

"1. A minute gun.

"2. A burning tar barrel, oil barrel, &c.

"3. Rockets or shells, fired one at a time at short intervals.

"*Signals to be made by Ships wanting a Pilot.*"

"*In the Daytime.*

"1. The Union Jack at the fore;

"2. The *Code* signal P T.

"*At Night.*

"1. A blue light every fifteen minutes; or,

"2. A bright white light, shewn at frequent intervals just above the bulwarks, for about a minute at a time."

Q. Where are the signal stations on the East and South Coasts?

A. Flamborough Head, Bridlington, Grimsby; Yarmouth (Norfolk); Aldborough; Broadstairs; Deal; Dover; Dungeness; Yarmouth (Isle of Wight); Prawle Point; Penzance (Mounts Bay).

INSTUCTIONS FOR THE GUIDANCE OF MASTERS AND SEAMEN WHEN USING THE ROCKET APPARATUS FOR SAVING LIFE.

In the event of your vessel stranding on the coasts of the United Kingdom, and the lives of the crew being placed in danger, assistance will, if possible, be rendered from the shore in the following manner; namely,

1. A rocket with a thin line attached will be fired across your vessel. Get hold of this line as soon as you can; and when you have secured it, let one of the crew be separated from the rest, and, if in the daytime, wave his hat or his hand, or a flag or handkerchief; or, if at

night, let a rocket, a blue light, or a gun be fired, or let a light be displayed over the side of the ship and be again concealed, as a signal to those on shore.

2. When you see one of the men on shore separated from the rest, wave a RED flag, or, (if at night) show a RED light and then conceal it; you are to haul upon the rocket line until you get a tailed block with an endless fall rove through it.

3. Make the tail of the block fast to the *mast about* 15 *feet above the deck*, or if your masts are gone, to the best place that can be found, bearing in mind that the lines should be kept clear from chafing the wreck, and that space is left above for the hawser (see par. 5). When the tail block is made fast, and the Rocket line unbent from the Whip, let one of the crew, separated from the rest, make the signal required by Article 1. above.

4. As soon as the signal is seen on shore a hawser will be bent to the whip line, and will be hauled off to the ship by those on shore.

5. When the hawser is got on board, the crew should at once make it fast to the same part of the ship as the tailed block is made fast to, *only about* 18 *inches higher, taking care that there are no turns of the whip line round the hawser.*

6. When the hawser has been made fast on board, the signal directed to be made in Article 1. above is repeated.

7. The men on shore will then pull the hawser taut, and by means of the whip line will haul off to the ship a sling life-buoy, into which the person to be hauled ashore is to get and be made fast. When he is in, and secure, one of the crew must be separated from the rest, and again signal to the shore as directed in Article 1. above. The people on shore will then haul the person in the sling to the shore, and when he has landed will haul back the empty sling to the ship for others. This operation will be repeated until all persons are hauled ashore from the wrecked vessel.

8. It may sometimes happen that the state of the weather and the condition of the ship will not admit of a hawser being set up; in such cases a sling life-buoy will be hauled off instead, and the shipwrecked persons will be hauled through the surf, instead of along a hawser.

Masters and crews of stranded vessels should bear in mind that SUCCESS in landing them in a great measure DEPENDS UPON THEIR COOLNESS AND ATTENTION TO THE RULES HERE LAID DOWN; and that by attending to them many lives are annually saved by the rocket apparatus on the coasts of the United Kingdom.

The system of signalling must be strictly adhered to; and all women, children, passengers, and helpless persons should be landed before the crew of the ship.

NOTE.—When shipwrecked men are hauled through the surf, there is a great risk of them being drowned, or seriously hurt; it is therefore only in an extreme case that it should be done.

Q. You join a ship either as second or only, or first mate. What are the first things you do?

A. Report myself, ask for orders, if none given take an account of everything that will be under my charge. Examine the ship outside and inside, below and aloft, and note the order that everything is in.

Exn. 4a. *Port of*.....

Rotation No.

EXAMINATION PAPER TO BE USED BY ALL CANDIDATES WHEN APPEARING FOR EXAMINATION FOR THE FIRST TIME ONLY.

The Applicant is to write a short definition against so many of the following terms as may be marked with a cross by the Examiner. The writing should be clear, and the spelling should not be disregarded.

1.—The Equator is that great circle which is equidistant from both poles of the earth.

2.—The Poles are the ends of the axis of the earth, or those of the axis of the heavens.

3.—A Meridian is a great circle passing through the poles of either the earth or the heavens.

4. The Ecliptic is that great circle which is the sun's apparent yearly path in the heavens.

5.—The Tropics are two parallels of latitude about 23° 28′ from the equator, one on each side of it.

6.—Latitude of a place is the arc of the meridian between it and the equator.

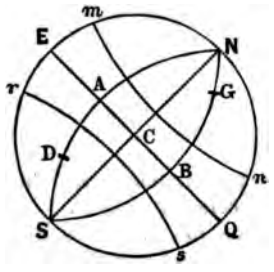
7. Parallels of latitude are small circles parallel to the equator.

8.—Longitude of a place is the arc of the equator between its meridian and that of Greenwich.

ILLUSTRATIONS OF THE DEFINITIONS.

The following illustrations are in general drawn on the *Stereographic Projection of the Sphere*, in which a great circle is taken as the primitive, and the eye is supposed to be at its pole. For more information on this subject, see the Theory of Navigation and Nautical Astronomy.

Figure 1.



Definition 1. Figure 1. ECQ is the *Equator*.

Def. 2. Fig. 1. N.S. are the *Poles*.

Def. 3. Fig. 1. NESQN, NCS, NBS are *Meridians*.

Def. 4. Fig. 6. MT is the *Ecliptic*.

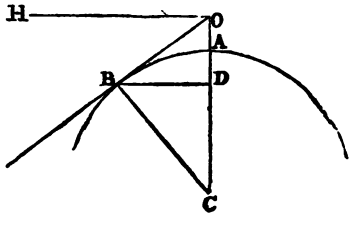
Def. 5. Fig. 1. mn, rs are the *Tropics*.

Def. 6. Fig. 1. Let G be Greenwich, D a place in south latitude. GB is the *Latitude* of Greenwich; DA is the *Latitude* of D.

Def. 7. Fig. 1. mn, rs, are *Parallels of Latitude*.

Def. 8. Fig. 1. AB is the *Longitude* of D.

Figure 2.



9.—The Visible Horizon is that circle which bounds the spectator's view at sea.

10.—The Sensible Horizon is the plane passing through the observer's place, and to which a plumb line is perpendicular.

11.—The Rational Horizon is the plane passing through the centre of the earth, and parallel to the sensible horizon.

12.—Artificial Horizon and its use.—A reflecting fluid at rest; its use is to obtain altitudes of celestial objects.

Or it is a vessel containing oil, tar, quicksilver, or other liquid; it is used on shore to obtain altitudes of celestial objects.

13.—True course of a Ship is the angle between the true meridian and the ship's track.

14.—Magnetic course is the angle between the magnetic meridian and the ship's track.

15.—Compass course is the angle between the compass needle and the ship's track.

16.—Variation of the compass is the angle between the true and magnetic meridians.

17.—Deviation of the Compass is the angle between the compass needle and the magnetic meridian.

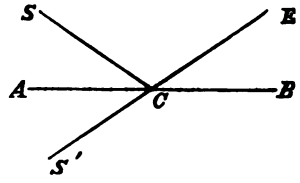
18.—The Error of the Compass is the angle between the true North and the North point of the compass.

Def. 9. Fig. 2. The circle of which BD is the radius is the *Visible Horizon.*

Def. 10. HO is the *Sensible Horizon.*

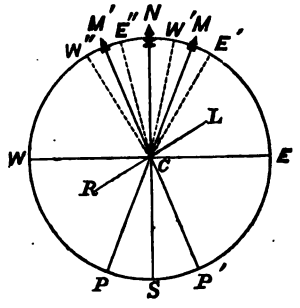
Def. 11. Fig. 2. The plane through C parallel to the Sensible Horizon is the *Rational Horizon.*

Figure 3.



Def. 12. Fig. 3. Let AB be the surface of the fluid, E the eye, S the sun, S' its reflected image. Then altitude=ACS=ECB=ACS'=$\frac{1}{2}$ SCS'.

Figure 4.



Def 13. Fig. 4. Let NCS be the true meridian, N.S. the North and South points of the true compass, E.W. its East and West points and C its centre. Let MP, M' P' be magnetic meridians; CE', CE", CW', CW" directions of the compass needle; and RL the rhumb line, or ship's track. Then the angle NCL is the *True Course.*

Def. 14. Fig. 4. The angle MCL or M'CL is the *Magnetic Course.*

Def. 15. Fig. 4. The angle E'CL W'CL, E"CL, or W"CL, is the *Compass Course.*

Def. 16. Fig 4. The angle NCM is *East Variation of the Compass,* and NCM' is *West Variation.*

Def. 17. Fig. 4. The angles MCE', M'CE" are *East Deviations of the Compass*; and MCW', and M'CW" are *West Deviations.*

Def. 18. Fig. 4. The angles NCE', NCW' *are East Errors of the Compass*; and NCE", NCW" *are West Errors.*

Or,

18. The Error of the Compass is the combined effect of the variation and deviation.

19. Lee Way is the angle between the ship's wake and the line of her keel.

20. Meridian Altitude of a Celestial Object is its angular distance above the horizon, when the object is on the meridian.

21. Azimuth is the angular distance of a celestial object from the observer's meridian; it is measured on the horizon.

22. Amplitude is the angular distance of a celestial object on the horizon, from the prime vertical.

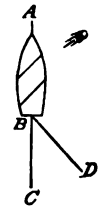
23. Declination is the angular distance of a celestial object from the equinoctial; it is on a meridian.

24. Polar Distance is the angular distance of a celestial object from the elevated pole; it is measured on a meridian.

25. Right Ascension is the angle between two meridians, one passing through the celestial object, the other through the first point of Aries; it is measured eastward on the equinoctial.

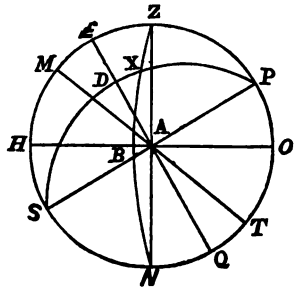
26. Dip or Depression of the Horizon is the angular distance of the visible below the sensible horizon.

Figure 5.



Def. 19. Fig. 5. Let ABC be the line of the ship's keel, and BD the direction of her wake, then CBD is the leeway.

Figure 6.



Def. 20. Fig. 6. If M be the object on the meridian, HAM is its *Meridian Altitude.*

Def. 21. Fig. 6. If X be the object, the angle HZB, or arc HB, is the *Azimuth.*

Def. 22. Fig. 6. If B be the object, the angle AZB, or arc AB is the *Amplitude.*

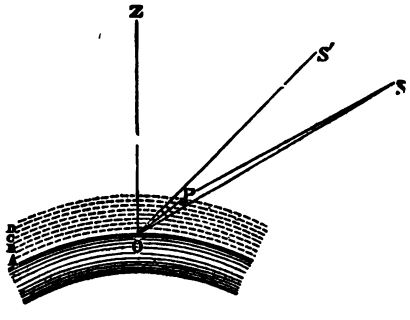
Def. 23. Fig. 6. If X be the object, the arc XD is the measure of the *Declination.*

Def. 24. Fig. 6. The arc PX is the measure of the *Polar Distance* of X.

Def. 25. Fig. 6. The arc AQED is the measure of the *Right Ascension* of X.

Def. 26. Fig. 2. The angle HOB is the *Dip.*

Fig. 7.



27. Refraction is the bending of rays of light caused by the atmosphere.

28. Parallax is the angle at a celestial object subtended by that radius of the earth which is drawn from the observer's position.

29. Semi-diameter is the angle ta the earth's centre subtended by the radius of the celestial object.

30. Augmentation of Moon's Semi-diameter is the increase of the semi-diameter, owing to the increase of the moon's altitude.

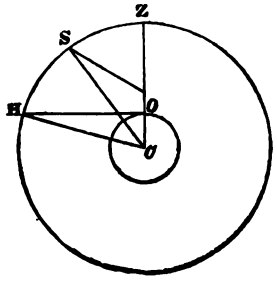
31. Observed Altitude is the angular distance of an object above the horizon as shewn by a sextant.

32. Apparent Altitude is the observed altitude corrected for index error, dip, and semi-diameter.

33. True Altitude is the apparent altitude corrected for refraction and parallax.

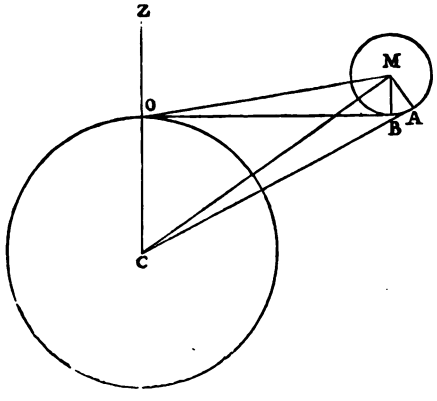
Def. 27. Fig. 7. The angle SOS′ is the *Refraction.*

Figure 8.



Def. 28. Fig. 8. The angle CSO is the *Parallax.*

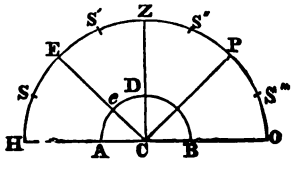
Figure 9.



Def, 29. Fig. 9. The angle ACM, or BOM is the *Semi-diameter.*

Def. 30. Fig. 9. BOM—ACM is the *Augmentation of the Moon's Semi-diameter.*

Figure 10.



Defs. 31, 32, and 33. Fig. 10. Let E be the centre of the celestial object, then the angle HCE is the *True Altitude* of the centre. This is found by applying the Index Error and Dip to the *Observed Altitude* of the Lower Limb, the result is the *Apparent Altitude* of the Lower Limb, to which the Refraction, Parallax, and semi-diameter are applied.

34. Zenith Distance is the angular distance of a celestial object from the zenith; or it is=90°—altitude.

35. Vertical Circles are great circles passing through the zenith, and therefore perpendicular to the horizon.

36. Prime Vertical is the vertical circle which passes through the true East and West points of the horizon.

37. Civil time begins at Midnight and ends at the following Midnight. The first 12 hours is called A.M., the second P.M.

38. Astronomical Time begins at noon and ends at the following noon.

39. Sidereal Time is the hour angle of the first point of Aries.

40. Mean Time is the hour angle of the mean sun.

41. Apparent Time is the hour angle of the true sun.

42. Equation of Time is the difference between mean and apparent time.

43. Hour Angle of a Celestial Object is its angular distance from the observer's meridian; it is measured on the equinoctial.

44. Complement of an Arc or angle is the difference between the arc or angle and 90°.

45. Supplement of Ditto is the difference between the arc or angle and 180°.

Def. 34. Fig. 10. The angle ZCE is the *Zenith Distance* of E.

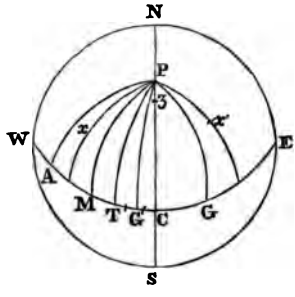
Def. 35. Fig. 6. ZAN, ZBN, and HZON are *Vertical Circles.*

Def. 36. Fig. 6. ZAN is the *Prime Vertical.*

Def. 37. Fig. 6. *Civil Time* begins when the sun is on the lower meridian HNO.

Def. 38. Fig. 7. *Astronomical Time* begins when the sun is on the upper meridian HZO.

Figure 11.



Def. 39. Fig. 11. See Page 16 "Theory" for the explanation of the figure. The angle CPA is the *Sidereal Time.*

Def. 40. Fig. 11. The angle CPM is the *Mean Time.*

Def. 41. Fig. 11. The angle CPT is the *Apparent Time.*

Def. 42. Fig. 11. The angle TPM is the *Equation of Time.*

Def. 43. Fig. 11. CPx is the *Hour Angle* of x.

Def. 44. Fig. 6. The arc ZE is the *Complement* of HE; and the angle ZAE is the *Complement* of HAE.

Def. 45. Fig. 6. The arc EZO is the *Supplement* of HE; and the angle EAO is the *Supplement* of HAE.

Exn. 9. *Port of*.....

Rotation No.

ADJUSTMENTS OF THE SEXTANT.

The applicant will answer in writing, on a sheet of paper which will be given him by the Examiner, all the following questions, numbering his answers with the numbers corresponding to the questions.

1. What is the first adjustment of the sextant?
2. How do you make that adjustment?
3. What is the second adjustment?
4. Describe how you make that adjustment?
5. What is the third adjustment?
6. How would you make the third adjustment?
7. In the absence of a screw how would you proceed?
8. How would you find the index error by the horizon?

REMARKS.—The Examiner may take a sextant and ask the Candidate to point out the different parts of it, and show how he would use it.

ANSWERS TO THE ADJUSTMENTS OF THE SEXTANT.

1.—The index glass must be perpendicular to the plane of the sextant.

2.—Place the index near the middle of the arc, and look into the index glass so that you can see both the arc and its reflection; if they be in one line, the glass is perpendicular, but if not in one line, they are brought so by gently moving the screws in the frame upon which the glass stands.

3.—The horizon glass must be perpendicular to the plane of the sextant.

4.—Place the zero of the vernier on O on the arc, hold the instrument obliquely, with its face upwards, and look at the horizon; if the true and reflected horizons be in one line, this adjustment is perfect; but if not, they must be brought in one line by gently moving a screw at the back of the glass.

5.—The index and horizon glasses must be parallel when the index is at O.

6.—Place the index at O, and hold the instrument vertically, look at the horizon, if the true and reflected horizons be in one line, this adjustment is perfect; but if they be not in one line, move a screw at the back of the horizon glass till they are.

7.—I would find the index correction, or, as it is called, the index error.

8.—Hold the instrument vertically, and, looking at the horizon, I would move the tangent screw until the horizon in both parts of the horizon glass form one line; the reading is the index error.

9.—How is it to be applied?

10.—Place the index at error of minutes to be added, clamp it, and leave it.

NOTE.—The Examiner will see it is correct.

11.—The Examiner will then place the zero of the vernier on the arc, not near any of the marked divisions, and the candidate will read it.

NOTE.—In all cases the applicants will name, or otherwise point out, the screws used in the various adjustments.

NOTE to 10 and 11.—When the Examiner is satisfied that the candidate can read the arc of the sextant both on and off the arc, it will be sufficient to place his initials against 10 and 11 on the paper containing the answer.

The above completes the examination of Second and only Mates.

In addition to the above, First Mates and Masters will be required to state in writing:—

12.—How do you find the index error by the sun?

13.—How is the same applied?

14.—What proof have you that these measurements or angles have been taken with tolerable accuracy?

REMARKS.—The Examiner may take the sextant in his hand and ask the candidate to point out the index glass, horizon glass, arc, vernier, tangent screw, and so on. He may also ask him how he holds the sextant when he makes the several adjustments, and uses it.

9.—To be added when the reading is off the arc, and to subtract when the reading is on the arc.

12.—I would place the index at about 32′ on the arc, and, looking at the sun, two suns will be seen; bring their upper and lower limbs in exact contact, read off and mark down, then place the index at about 32′ off the arc, or to the right of 0, bring the lower and upper limbs in contact as before, read off and mark down; half the difference of these two readings will be the index error.

13.—It is to be added when the greater reading is off the arc, and subtracted when the greater reading is on the arc.

14.—I would add the two readings together, and divide the sum by 4; if the measurements be correct, the result should be nearly equal to the semi-diameter for the day, as given in the Nautical Almanac. If they do not so agree, I would repeat my observations until they do.

LEADING LIGHTS AND FOG SIGNALS.

ENGLISH CHANNEL.—ENGLISH COAST.

Inter. denotes Intermitting. Rev. denotes Revolving. L.S. means Light Ship.

LEADING LIGHTS.					FOG SIGNALS.	
Name.	Num.	Kind.	Time. Rev.	Remarks. Day Marks, &c.	Signals.	Remarks.
Bishop Rock	1	Fixed	.....	.....	Bell	Sounded every 10 seconds.
St. Agnes	1	Rev.	½ minute			
Seven Stones L.S.	1	Rev.	1 minute	Three flashes in quick succession, in 24 seconds, 36 seconds darkness.	Siren	Three blasts in quick succession every 2 minutes.
Longships	1	Fixed	.....	.....	Bell	Sounded twice in quick succession every quarter of a minute.
Wolf Rock	1	Rev.	30 seconds	*Red* and *White* alternately	Bell	Sounded three strokes in quick succession every quarter of a minute.
Lizard	2	Fixed	.....	In one W by N, northerly. Clear the Manacles.....	Trumpet	One blast every 5 minutes.
St. Anthony	1	Rev.	20 seconds	Fixed light in same tower, when in sight clears the Manacles.	Bell	Struck 4 times every alternate half minute.
Eddystone	1	Fixed	.....	.....	Bell	Sounded 5 times in quick succession every half minute.
Start Point	1	Rev.	1 minute	.....	Horn	One blast every 3 minutes.
Portland Bill	2	Fixed	.....	Different Heights. In one NW by N. Lead between the Race and Shambles.		
Shambles L.S.	1	Fixed	.....	Ball on mast	Trumpet	One blast every 2 minutes.
Needles	1	Fixed	.....	*Red* to seaward. *White* over Needles Channel.....	Bell	Sounded continually.
St. Catherine Point	1	Fixed	.....	Visible seaward between the bearings of SE ¼ E and W ¾ N.	Horn	Two blasts in quick succession every 4 minutes.
Nab L.S.	2	Fixed	.....	Ball on each mast	Gong	
Owers L.S.	1	Rev.	30 seconds	Twice *White*, once *Red*. Ball on Mast.....	Trumpet	Six blasts every minutes.
Beachy Head	1	Rev.	2 minutes	Visible ¼ minute. Invisible 1¾ minutes.....		
Royal Sovereign Shoals L.S.	1	Fl.	1 minute	Three flashes in 23 seconds, 37 seconds darkness. Small ball over large one.	Gong	
Varne L.S.	1	Rev.	20 seconds	*Red*. Ball on mast	Gong	
Dungeness	1	Fixed	.....	.....	Horn	Two blasts in quick succession every 2 minutes.
Auxiliary Light	1	Fl.	2 seconds	On the extreme point SSE ¼ E, 225 yards from the main tower.		
South Foreland	2	Fixed	.....	In one W ¾ N. Lead clear of south end of Goodwin Sands		

South Sand Head L.S.....	1	Fixed	.....	Ball on mast	Trumpet	Will sound a blast of 5 seconds duration every two minutes.
East Goodwin L.S.....	1	Rev.	15 seconds	*Green.* Diamond and half diamond on mast.....	Gong	
Gull L. S.....	1	Rev.	20 seconds	Ball on mast	Gong	
North Sand Head L.S.....	1	Fl.	I minute	Three masts with balls. Three flashes in 24 seconds 36 seconds of darkness.	Gong	
North Foreland.....	1	Fixed	.....			

FRENCH COAST.

Ushant, N.W. end.....	1	Rev.	20 seconds	Twice *White*, once *Red*.....	Trumpet	Blast of 2 seconds at intervals of 10 seconds.
Ushant, N.E. end	1	Fixed	.....			
Ile Vierge.....	1	F. & Fl.		*Red* flash every 4 minutes.		
Ile de Bas.....	1	Rev.	1 minute			
Triagoz	1	F. & Fl.	Fl. 30 seconds	*Red. White.*		
Sept Iles.....	1	F & Fl.	.....	Flash every 3 minutes.		
Heaux De Brehat	1	Fixed	.....	*Red* flash between W.S.W. and W. ¼ S., *Red* fixed between N.W. ¼ N. and W. by N. ⅜ N.		
Roches Douvres.....	1	Fl.	5 seconds	.....	Bell	Sounded at intervals of 3 seconds.
Hanois.....	1	Rev.	45 seconds	*Red*		
Casquets.....	1	Fl.	30 seconds	Triple flash; three successive flashes of about 2 seconds' duration each, with intervals between each flash of about 3 seconds of darkness, the third flash being followed by an eclipse of about 18 seconds; or shortly thus: 3 flashes in 12 seconds, 18 seconds darkness.	Siren	3 blasts of 2 seconds duration each, in quick succession, every 5 minutes.
Cape la Hague	1	Fixed				
Cape Barfleur	1	Rev.	30 seconds			
Cape la Heve.....	2	Fixed				
Fecamp.....	1	Fixed				
Point Ailly	1	Rev.	1 minute			
Point Toquet.....	2	Fixed	.....	N. by E. ⅜ E. and S. by W. ⅜ W.		
Alprech Point.....	1	F & Fl.	.....	*Red* flash every 2 minutes.		
Cape Grisnez	1	Rev.	30 seconds			
Calais	1	Fl.	.....	Flash every 4 minutes.		

EAST COAST OF ENGLAND.

LEADING LIGHTS.

Name.	Num.	Kind.	Time Rev.	Remarks. Day Marks, &c.
Galloper L.S.	2	Fixed	.....	Ball on each mast.
Kentish Knock L.S.	1	Rev.	1 minute	Small ball over a large ball.
Sunk L.S	1	Rev.	45 seconds	*Red* and *White* alternately. Half ball over a ball...
Shipwash L.S.	1	Fixed	.....	Ball on mast.
Orfordness	2	Fixed	.....	In one N.E. ½ E., clear the Whiting; and S.W. ½ W. lead between Aldbro' Napes and Sizewell Bank.
Corton L.S.	1	Rev.	20 seconds	*Red*. Half ball under a ball.
Lowestoft	2	...	.....	Lower *Red* occult. Upper rev. 30 seconds. In one N.N.W. ½ W. and S.S.E. ½ E.
St. Nicholas Gat L.S.	2	...	.....	Lower *Red* flashes every 10 seconds. Upper fixed. Ball on mast.
Newarp L.S.	1	Fl.	.....	Ball on 3 masts. Light. Three flashes in 24 seconds, 36 seconds of darkness.
Cockle L.S.	1	Rev.	1 minute	Ball on mast.
Winterton	1	Fixed		
Hasborough	2	Fixed	.....	In one N.W. ¾ W. lead through Hasborough Gat.
Hasborough L.S.	2	Fixed	.....	Ball on each mast. It is proposed, during this year to place a light vessel on the south end of Has- [bro' Sand.
Cromer	1	Rev.	1 minute	
Leman and Ower L.S.	1	Fl.	30 seconds	Two flashes in quick succession. Ball on each mast
Dudgeon L.S.	1	Fixed	.....	Ball on mast.
Outer Dowsing L.S.	1	Rev.	20 seconds	*Red*. Half ball over a ball
Inner Dowsing L.S.	1	Rev.	20 seconds	*Green*. Ball over a ball.
Spurn L.S.	1	Rev.	1 minute	Ball on mast
Spurn Point	2	Fixed		In one N.W. and S.E.
Flamborough	1	Rev.	30 seconds	Twice *White*, once *Red*. Bearing N. by E. clears N. end of Smithic.

FOG SIGNALS.

Signals.	Remarks.
Gong	
Horn	Giving 2 blasts in quick succession every 2 minutes.
Gong	
Horn	Giving blasts of 5 seconds duration at intervals of 2 minutes.
Gong	
Bell	Sounded three times in quick succession every quarter of a minute.
Gong	
Trumpet	3 blasts in quick succession every 2 minutes.
Gong	
Gong	
Gong	
Gong	
Horn	Giving blasts of 5 seconds duration at intervals of two minutes.
Gong	
Trumpet	Two blasts in quick succession every two minutes.
Rocket	Fired every 10 minutes.

Whitby	2	Fixed	.....	In one S. by E. ½ E. Easterly, and N. by W. ½ W. westerly. Red Light from North Tower over Scar Rock.		
Hartlepool	1	Fixed				
Souter Point	1	Fl.	30 seconds	.....	Horn	One blast every minute.
Tynemouth	1	Rev.	1 minute	*Red.*		
Coquet	1	Fixed	.....	*Red* over Bulmer Bush and Bulmer Stile.		
Farn	1	Rev.	30 seconds			
	1	Fixed	.....	Visible between S.S.E. and S. by E, but not from south		
Longstone	1	Rev.	30 seconds	.....	Horn	Will give 2 blasts in quick succession every two minutes.

WEST COAST OF ENGLAND AND WALES.

Godrevy	1	Fl.	10 seconds	*Red.* Fixed. In same tower visible from S by E to SE	Bell	One stroke every 5 seconds.
Trevose Head	2	Fixed	.....	Different Heights.		
Hartland Point	1	Rev.	30 seconds	Twice *White*, once *Red*	Horn	Will give blasts of 5 seconds duration every 2 minutes.
Lundy Island	2	....	.....	One rev. 2 minutes. One fixed.....	Rocket	Every 10 minutes from the West side of the island.
Nash	2	Fixed	.....	S.E. by E. ½ E.		
Scarweather L.S.	1	Rev.	20 seconds	*Red.* Half ball over ball	Trumpet	2 blasts in quick succession every 2 minutes.
Helwick L.S.	1	Rev.	1 minute	Ball on mast	Horn	Giving one blast of 5 seconds duration every 2 minutes.
Mumbles	1	Fixed				
Caldy Island	1	Fixed				
St. Ann's	2	Fixed	.....	Different heights. In one N.N.W., clear Crow and Toe Rocks. Red in line of Chapel Rocks.	Trumpet	One blast every 3 minutes.
Smalls	1	Fixed	.....	*Red* in line of Hats and Barrels	Rocket	Every half-hour. Also Bell.
South Bishop	1	Rev.	20 seconds	.....	Bell	Proposed.
Cardigan Bay L.S.	1	Rev.	30 seconds	*Red.* Ball on mast	Gong	
Bardsey	1	Fixed	.....	.....	Trumpet	One blast every 5 minutes.
Caernarvon Bay L.S.	1	Rev.	20 seconds	Twice *White*, once *Red.* Small ball over large one.	Trumpet	One blast every 2 minutes.
South Stack	1	Rev.	1 minute	A smaller light, revolving in 1½ minutes is occasionally shewn about 30 yards north of the main lighthouse.	Bell	Sounded once every 15 seconds. A gun is fired from the North Stack every 10 minutes.
Skerries	2	Fixed	.....	Red light in line of Coal and Ethel Rocks	Trumpet	One blast every 3 minutes.
Point Lynus	1	Int.	10 seconds	Visible 8 sec. Invisible 2 sec.		

WEST COAST OF ENGLAND, WALES AND SCOTLAND (Continued).

Name.	Num.	Kind.	Time Rev.	Marks. Day Marks, &c.	Signals.	Remarks.
Great Orme Head	1	Fixed	....	*Red* from W. ¼ S. to W. ¼ N.		
Air Point.....	1	Fixed	....	*Red* between the bearings of S.E. ¼ S. and W. ⅜ S.		
Hoylake	2	Fixed	....	Different heights.		
Leasowe	1	Fixed				
Bidston	1	Fixed				
Rock	1	Fl.	30 seconds	Tide light 11 feet. Ball the same by day	Bell	
Crosby Point	1	Fixed	....	.....		
Crosby L.S.	3	Fixed	....	Triangular. *Red* Ball on mast	Horn	Sounded 3 times in a minute. If horn not ready, a bell will be sounded.
Bar L.S.	1	Fixed	....	.....	Horn	Will sound 3 times in a minute If horn not ready, a bell will be sounded.
Formby L.S.	1	Rev.	....	*Red.* Ball on mast.....	Bell	
N.W. Light Ship.....	1	Fl.	30 seconds	Black ship, white stroke. Ball on foremast.....	Bell	
Walney	1	Rev.	1 minute	*Red* tide light fixed.		
Morecambe Bay L.S.....	1	Rev.	30 seconds	*Red.* Ball on mast.....	Trumpet	One blast every two minutes.
St. Bees Head	1	Fixed	....	.....		
ISLE OF MAN.						
Chicken Rock	1	Rev.	30 seconds	.....	Bell	Sounded at intervals of ½ minute.
Douglass	1	Fixed				
Bahama Bank L.S.	1	Fl.	30 seconds	Shews 2 flashes in quick succession every half minute. One mast with ball.	Siren	Sounded twice in quick succession every 2 minutes.
Ayre Point.....	1	Rev.	1 minute	*Red* and *White* alternately.		
NORTH CHANNEL.—WEST COAST OF SCOTLAND.—FIRTH OF CLYDE.						
Mull of Galloway	1	Int.	45 seconds	Visible 30 seconds, invisible 15 seconds.		
Corsewall.....	1	Rev.	1 minute	*Red* and *White* alternately.		
Pladda.....	2	Fixed	....	.....	Horn	Sounded for 5 seconds, with an interval of 10 seconds.
Cumbrae	1	Fixed	....	.....	Trumpet	Blast of 5 seconds. Interval 18 to 20 seconds.
Davar Island	1	Rev.	30 seconds			
Sanda Island	1	Fixed		*Red*	Siren	Sounded for 7 seconds in every minute.
Mull of Cantyre	1	Fixed				
Rhynns of Islay	1	Fl.	5 seconds			

Calf Rock	1	Fl.	15 seconds			
Skelligs	1	Fixed.				
Fastnet	1	Rev.	1 minute			
Kinsale, Old Head	1	Fixed	....			
Daunt Rock L.S.	1	Fixed	....	*Red*	Gun	Fired twice, with an interval of 5 minutes every quarter of an hour
Roche Point	1	Fixed	....	Between N.E. by E. and N.E. ½ N.		
	1	Occ.	15 seconds	*Bright* 15 seconds, eclipsed 5 seconds.	Bell	Sounded twice in a minute.
Ballycottin	1	Fl.	10 seconds		Bell	
Minehead	1	Int.	....	*Bright* 50 seconds, *Dark* 10 seconds.		
Waterford, Hook Head	1	Fixed	....		Gun	Fired every 10 minutes.
Saltees L.S.	1	Fl.	1 minute	Three flashes in 28 seconds, 37 seconds darkness.	Trumpet	A blast for 5 seconds, then an interval of 20 seconds; another blast for 5 seconds, then an interval of 4½ minutes.
Tuskar	1	Rev.	1 minute	Twice *White*, once *Red*	Rocket	Fired every 5 minutes.
Lucifer L.S.	1	Fixed	....	*Red.* Ball at main	Gong	
Blackwater	1	Fixed	....	Two Balls at main	Gong	
South Arklow L.S.	1	Rev.	30 seconds	Half ball over ball	Gong	
North Arklow L.S.	1	Fl.	1 minute.	Two flashes in succession, followed by 45 seconds darkness. Ball on each mast.		
Wicklow Head	1	Int	....	Visible 10 seconds, invisible 8 seconds	Gong	
Codling L.S.	1	Rev.	20 seconds	*Red.* Half ball under ball		
Wreck of the Vanguard	1	Rev.	Every minute	*Green.*	Gong	
Kish L.S.	1	Rev.	1 minute	Ball on main	Gong	Sounded. Gun fired twice in quick succession every 15 minutes when mail expected.
Bailey	1	Fixed	....		Horn	A siren giving a blast of 5 seconds every minute.
Rockabill	1	Fl.	12 seconds			
Haulbowline	1	Fixed	....		Bell	Sounded every half minute.
St. John's Point	1	Int.	1 minute	*Red. Dark* 15 seconds, *Bright* 45 seconds	Bell	
South Rock	1	Rev.	1½ minute		Gun	Fired every 15 minutes.
Copeland	1	Fixed	....		Bell	Fog signal proposed.
Maidens	2	Fixed	....	Different Heights.		
Rathlin	2	..	....	Upper Inter. *Bright* 50 seconds, eclipsed 10 seconds. Lower fixed.	Gun	Fired at intervals of 15 minutes.
Inishowen	2	Fixed				
Inishtrahull	1	Rev.	30 seconds			

The bearings are magnetic, *and are given from seaward.*

The following regulations have been established respecting the several light-vessels on the coasts of England and Ireland, viz.:—

A white light is exhibited from the forestay of each light-vessel, at a height of six feet above the rail, for the purpose of showing in which direction the vessel is riding, when at her station.

When a light-vessel is driven from her proper position to one where she is of no use as a guide to shipping, the following signals will be made, viz.:—

The usual lights will not be exhibited, but a fixed *red* light will be exhibited at each end of the vessel, and a *red* flare shown every quarter of an hour. By day, the balls or other distinguishing mast-head marks will be struck.

If from any cause the light-vessel be unable to exhibit her usual lights whilst at her station, the riding light only will be shown.

The mouths of fog horns, in light-vessels, are pointed to windward; also those on the land with the wind from seaward.

When, from any of the light-ships, a vessel is seen standing into danger, a gun will be fired and repeated until observed by the vessel; also the two signal flags J. D. of the Commercial Code, "*You are standing into danger*," will be hoisted and kept flying until answered.

In England, whenever a light-vessel or other craft is anchored to mark the position of a wreck, the top-sides will be coloured green, and she will be further distinguished by day, by three balls placed on a yard 20 feet above the sea, *two balls (vertically) on the side on which navigating vessels may safely pass* and one on the other; and by night, by three fixed *white* lights similarly arranged and with the same meaning. These marking vessels, when so employed and fitted, will not show the ordinary riding light.

NOTE.—The firing special rockets (of little sound but of great brilliancy) immediately after a gun from a light-vessel will denote the need of assistance from the shore; rock lighthouses are also supplied with the special call rockets, for use when assistance is required from the shore.

SOUNDINGS OFF THE HEADLANDS IN THE ENGLISH CHANNEL IN FATHOMS.

	Stand in.		*Stand off.*
Scilly	45		55
Lizard	40		50
Start	35		40
Portland	25		35
St. Catherine's Point	30		35
Beachy Head	15		25
Dungeness	20		22
South Foreland	12		20

On the parallel of the Bishop's Rock, and 20 miles to the westward of it, the soundings are about 60 fathoms, mud and oaze. Close to the Bishop about 40 fathoms, sand. To the northward of Scilly the soundings are about 50 fathoms, sand; 20 miles to the westward the soundings are about 60 fathoms, mud and oaze.

REMARKS.—Carefully consult the chart when in the vicinity of land or shoals, and take every opportunity of verifying the ship's position, by soundings and bearing and distance of known objects; when lying to in a very dark night, ascertain the direction of the ship's drift, by putting the deep sea lead over the weather quarter. Captains should keep their mates well informed of the ship's position, so that they may know how to act in a sudden emergency when he happens to be off the deck.

ADDITIONAL FOR ONLY MATE.

MATE'S DUTIES AND RESPONSIBILITIES.

Q. What are the mate's duties with respect to the receipt and discharge of cargo ?

A. To take account of it as it comes on board, or is discharged; and to give receipts to the persons who bring it, and get receipts from those who take it away.

Q. What clause should you insert in the receipts you give for cargo ?

A. "This receipt to be null and void when bills of lading are signed.'

Q. Suppose any part of the cargo be slightly damaged, such as marks defaced on a package, or hoops off a tallow cask ?

A. Note the fact on the receipt I give to the person who brought the cargo.

Q. If the damage be serious ?

A. Refuse to take it in; call the captain's attention to it.

Q. The captain signs bills of lading in the belief that the mate's account is correct, what should you do, or not do, in order that you may keep a correct account ?

A. Do nothing else but keep account while taking in cargo, or discharging it; suffer nothing to distract my attention.

Q. A cart load of goods are laid on the quay alongside of your ship, you give the cartman a receipt for them, who is then responsible for the goods ?

A. The owner.

Q. You go some distance from the ship for a raft of timber, or a lighter of grain, you give receipts for the goods, who is then responsible for them ?

A. The owner.

Q. What is your duty with reference to those goods ?

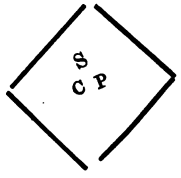
A. To take every care of them, and get them on board as soon as convenient.

Q. What is your duty with reference to purchases for the cargo ?

A. To have all purchases, and everything connected with taking in cargo, or discharging it in good order.

Remarks.—The mate should be careful to take the marks and numbers of the goods, and note them in the cargo book, thus :—

Account of casks of tallow received on board the *Neptune*, Oct. 12th, 1866, from lighter No. 275.

Marks.	Numbers.
	4554 4581 4575 4618 4541

By drawing a stroke under every fifth number, the account can be easily referred to, and the number of packages readily ascertained.

A dispute took place about a cask of tallow while taking in the above cargo. The merchant's clerk only kept tally, but the mate took the marks and numbers as well; the authorities therefore decided that the mate's account was correct, which proved to be the case.

The following legal decisions shew the importance of the mate's duty, and how seriously his conduct may affect his own hard-earned wages.

In a case tried in the Admiralty court, the judge said: "The doctrine I mean to hold is, that the mate having signed the receipt, he is responsible for the correctness of the signature, and that it is a certificate of the fact therein alleged; that he is bound by that signature; and if it should turn out afterwards that there is any deficiency in the "quantity" of cargo which comes to be delivered at the port, unless he can shew to the contrary, I should hold that that deficiency he is responsible for . . . . I cannot hesitate in saying for a single moment that it is my duty to pronounce . . . against the claim made by the mate" on the owner for wages held back by him to the value of the missing goods.

The mate has sometimes been made to pay part of the loss, when the judge has considered him partly, but not wholly, to blame.

On the other hand, neglect, or incompetency, must be clearly proved before the mate can be made to pay. He is not responsible if the captain require him to attend to other duties while he is taking in cargo; nor if the captain interfere improperly with him; nor for an accident.

LOG BOOK.

Q. What should you do with the ship's log book before making any entries in it?

A. Rule and head it properly?

Q. What entries do you make in it while in harbour ?

A. All matters having any reference to cargo, employment of crew, position of ship, and state of the weather.

Q. You have arrived in port, what entries would you make ?

A. The time of arrival in port, at her discharging berth, and is ready to discharge.

Q. What entries do you make at sea ?

A. All matters having any reference to the ship's position, as soundings, bearings and distances of fixed objects, latitude and longitude, wind and weather, sail, and employment of crew.

Q. You have let go your anchor ?

A. I would note the time, depth of water, bearings of marks, what chain was out, and the state of the weather.

Q. You bring up near a shoal; how would you sheer the ship ?

A. Generally towards the shoal.

Q. Why ?

A. Because the ground rises towards the shoal, and the anchor would hold better; and if the ship broke her sheer, she would go from the shoal; and, if in a narrow channel, to give more room to passing ships.

Q. You have a perishable cargo; it is bad weather, what must you do ?

A. Be careful to pump the ship, and note the facts thus:—Ship labouring in a heavy sea, straining severely, shipping a great deal of water, Pumps sounded...(so many)...inches water in them.

LIFTING HEAVY WEIGHTS.

Q. What weight would you lift with a yard arm tackle ?

A. Nothing heavier than a small cask of water. If compelled to use such a purchase for a heavy weight; untruss the yard, top it well up, and secure it well with lashings to the mast, rolling tackles and guys.

Q. Get a heavy weight, as marble, or machinery, on board ?

A. Rig a derrick with its foot near the side of the ship and pair of shears, with their feet placed fore and aft, or from one corner to another, over the hatchway, on beams, and support them well underneath by shores under the deck beams. Lash the foot to ringbolts or timber heads.

Or, untruss the mainyard, lash it to the mast, and secure it with guys and tackles, put chafing gear on where required, lash the derrick to the yard. Lift the weight by the derrick purchase, and assist it as much as possible with the shear purchase. When it is high enough and over the hatchway, lower both purchases.

In a steamer assist the purchases with her fixed purchases.

Q. Reeve a purchase in a threefold block ?

A. If the block have a rope strop, lead the first part of the fall over, or under the middle sheave. If the block be iron bound, lead the first part over one of the side sheaves, and so on, in regular order.

ACCIDENTS.

Q. A man falls overboard ?

A. Send a hand aloft to watch him. Heave life-buoys, spare spars, hen coops, or anything that is suitable towards the man to float him.

Round the ship to, and get her under such sail that a boat may be safely lowered. Or it may be necessary to put the ship about and stand towards the man.

Q. What should be done with boats ?

A. Boats should always be as near as possible ready for lowering down, falls clear, oars, tholes, plug and baler in them, and no more lashings on them than are necessary for their safety, and no lumber should be allowed to be put into them.

Q. The cargo is heating ?

A. Open hatches, and send a stream of air into the hold with windsails.

NOTE.—An experienced sampler of grain says that the above answer is wrong, and that the proper way to do is the same as in the answer to the next question; that is, prevent air, &c.

Q. A fire breaks out and cannot be got under ?

A. Prevent air from getting to it by putting on all hatches and tarpaulins over them, and stopping all holes and crevices.

Get the boats ready with water and provisions in them.

If practicable, bore holes in the deck above the fire, or in the sides, and let sea water on it.

Q. Make a raft ?

A. If the weather be moderate, a raft may be easily made by laying the larger spars, such as top-masts, jib-booms, and main booms parallel, and at a little distance from each other, and then lashing small spars, such as studdingsail booms and studdingsail yards across, then laying deals, bulkheads, &c., for a deck. Empty casks lashed to the larger spars will cause the raft to float better, and thus to bear more weight.

Some posts may be fixed up at the outside of the raft, and a rope hitched to the top of them to serve as bulwark.

Q. You are in a stranded vessel on a lee shore, make a small raft sufficient to land the crew ?

A. Lash three short spars in a triangular form, lash a small cask to the middle of each spar, and work a net inside the triangle to hold on by.

Q. Your bowsprit is sprung ?

A. Get the ship before the wind, reduce sail, take warps for stays, and tackles on them, set them up to the hooks, cat head, or to toggles through the hawseholes. Fish the bowsprit, send down the topgallant yard and mast.

Q. It is carried away ?

A. Take the most suitable spare spar and rig it for a jury bowsprit.

Q. You have no spare spars?

A. Lash the topgallant masts, yards and studdingsail booms, all together for a jury bowsprit; or send the mainyard down for that purpose.

Q. How far would you put it out?

A. About one-third.

Q. Your mast is sprung?

A. Get your ship before the wind, if it can be done, reduce sail, fish the mast, and secure it with additional preventer stays and tackles.

Q. It is carried away?

A. Clear away the wreck, and rig a jury mast with the strongest spare spar on board.

Q. Your bobstay is carried away?

A. Take hawser chains one round each side of the windlass, through each hawse pipe, make their ends fast to the bowsprit end, and heave them tight.

Q. Your weather main topsail brace is carried away, the yard flies against the lee rigging and won't come down, you cannot keep your ship away?

A. Let go the lee sheet, haul the lee clue up, then the weather one.

Q. You spring a spar, or carry it away?

A. Ease the particular spar by taking sail off the ship and keeping her before the wind. Fish the spar, or rig jury spars; make warps and tackles fast to them for preventer stays.

Q. Some of your stays, braces, sheets, parrals, &c., are broke, or some of your sails split?

A. Ease the particular part affected by lowering, hauling down, or brailing up sail, keeping the ship before the wind, or hauling yards aback and then repair damages.

ANCHORING.

BRINGING THE SHIP TO AN ANCHOR.

Q. Bring your ship up ?

A. Heave the windlass square palls down, put the Normans and riding chocks in their place, overhaul a range, haul the slack chain back from the anchor, get sufficient chain on deck, cockbill the anchor, see that the chain is clear of the anchor stock. If the wind were against the tide or athwart it, stem the tide, pick out a good berth, take a cast of the lead, stow all the square sails I could do without, let the ship have a little, either head or stern, way over the ground, so as to carry the chain as it falls clear of the anchor, stream the buoy and let go the anchor, being careful to sheer clear of it. If the wind were with the tide, stow all the square sails, take plenty of room clear of other ships, haul down the head sails, haul out the mizen, round the ship to and let go the anchor.

Q. How much range would you overhaul ?

A. Just sufficient to let the crown of the anchor touch the ground.

Q. You are brought up, it is stormy ?

A. Take a cast of the lead, take cross bearings of some remarkable objects, double reef the topsails and mizen, point the yards to the wind, get the second anchor ready, and see that the shackles could easily be knocked out of the cable chain in case I had to slip.

Q. It is a gale of wind, night time, you are on a lee shore and cannot keep off, there is a harbour to leeward where you have never been, but there are no pilots ?

A. Examine the chart very carefully, note the bearing of the light while running in, and also from the anchorage and the depth of water, also the wind and time of tide. Make memorandums of these things in large handwriting, so that they could be easily read on deck with the aid of a lamp. Then get the anchor and chain ready, and make every preparation so far as could be done in a heavy sea, and then keep the ship away for the harbour.

Q. It is a bar harbour ?

A. Set as much sail forward as the crew could manage—say jib and staysail, sheets flat aft, whole foresail, double or single-reefed foretopsail, close-reefed maintopsail, main yard square, main braces fast, two good hands at the helm, one at the lead, all the rest of the crew at the fore braces, and myself high enough to have a clear view a-head.

Q. You are over the bar, what next ?

A. Clue up, and haul down sail as snug as possible, and if there were time, stow it, when at the anchorage round the ship to and stop her way, then let go the anchor.

Q. You want to let go an anchor in a heavy sea?

A. Let go both stopper and shank painter at the same time.

RIDING AT SINGLE ANCHOR.

Explanation of the Nautical Terms used.

Supposing the ship to be riding *head on* to the tide. THEN,

If the wind be *ahead, or before the beam*, the ship is said to be RIDING LEEWARD TIDE. Figures 1, 2, 3.

If the wind be *aft, or on the quarter*, she is said to be RIDING WEATHER TIDE. Figures 7, 8, 9, 10, 11, 12.

If the wind be *abeam*, she is said to be RIDING WIND ATHWART THE TIDE. Figures 16, 17.

If she be swung by the force of the *tide*, she is said to be TIDE RODE.

If she be swung by the force of the *wind*, she is said to be WIND RODE.

When the tide is done and the ship begins to cant, she is said to TEND to WINDWARD or to LEEWARD, as the case may be.

It will be convenient to call the bow and quarter nearest to the anchor the *in-bow* and *in-quarter*, and those farthest from it, the *off-bow* and *off-quarter*.

Two Rules which include all others when a Ship is Riding at Single Anchor.

Q. What are the two rules which include all others when a ship is riding at single anchor?

A. The first rule is: *Always keep a taut cable* so as to keep the ship from her anchor, and to slue the anchor in the ground when the ship moves about or swings.

The second rule is: *Keep no more strain on the cable* than is necessary for the purposes of the first rule.

REMARKS.—If the learner go carefully over the following questions and answers, and observe the figures, he will perceive that they include every case that can occur while riding at single anchor, and are all applications of the two preceding rules; so that if he thoroughly understand these two rules, he will always know how to act with his ship.

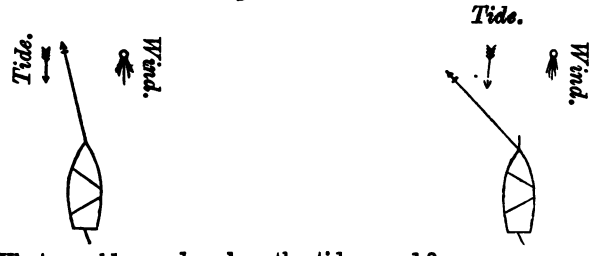
In the following figures, the direction from the beard to the point of an arrow denotes the *set* of the tide. When there is no arrow, it denotes that it is high or low water *slack*. The direction of the wind is shown by the brushes.

RIDING LEEWARD TIDE.

Q. If your ship were riding leeward tide *wind ahead*, what would you do during the strength of the tide?

A. If the tide were very strong, I would ride with a long scope of chain out, and place a man at the helm to steer the ship if it were necessary, and keep the anchor right ahead. If it were stormy, point the yards to the wind different ways. If the tide and wind were of moderate strength, give the ship a slight sheer the way I wanted her to swing.

Figures 1 and 2.

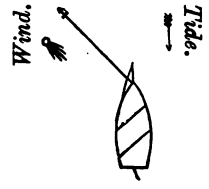


Q. What would you do when the tide eased?

A. Shorten in chain, and give the ship a broad sheer.

NOTE.—In figures 1 and 2, the yards should have been turned round to correspond with the way the ships are shore.

Figure 3.



Q. If she were riding with the wind before beam?

A. Give her a slight sheer to leeward during the strength of the tide. WHEN THE TIDE EASED, *If it were moderate.* Haul all the yards aback, hoist the fore topmast staysail, sheet to windward, and give her a broad sheer. *If it were stormy.* Point the yards to the wind and keep the staysail down during the whole of the tide.

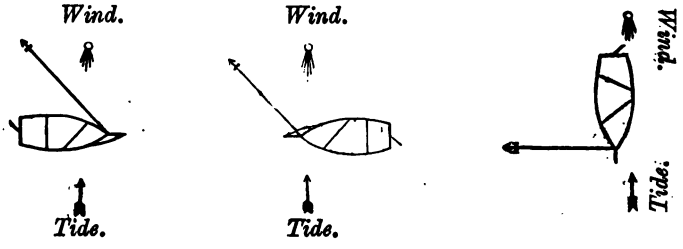
SHIP TENDING TO WINDWARD.

REMARKS.—In general, when the tide begins to change, it eases the chain so that it falls to the bottom and drags over it, which prevents the bow moving so fast as the stern, and thus the ship cants.

Q. If you wanted the ship to cant in any particular way?

A. Haul out the mizen, or some other suitable sail, or run a kedge away from aft.

Figures 4, 5 and 6.



Q. The ship tending to windward?

A. *If she canted with her head from her anchor.* Fill the yards, hoist the foretopmast staysail, lee sheet aft, and put the helm hard over to sheer her from her anchor.

If she canted with her head towards her anchor. Haul the yards aback weather staysail sheet up, and sheer her from her anchor. When the ship cants this way the chain does not chafe the copper.

NOTE.—Some seamen prefer to haul the main yard by, as in figures 4 and 5, in order that the ship may cant sooner.

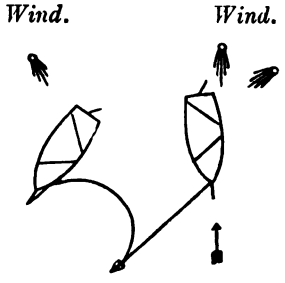
Q. The ship has just swung to the weather tide?

A. Haul the staysail down as soon as it begins to shake, while the tide is easy sheer the ship from her anchor, fill the main yard—that is, in this case, so that the lee yard arm would be above the in-quarter, haul the fore yard by; when the tide comes away strong, ease the helm.

RIDING WEATHER TIDE.

Tide stronger than wind.

Figures 7 and 8.



Q. You are riding weather tide, the tide stronger than the wind?

A. Keep the main yard full, fore yard by; if the ship were steered by a tiller, keep it pointed *to the anchor;* if not, keep the helm pointed *from the anchor.*

Q. Where would the anchor be?

A. On the lee bow.

Q. How long would the ship ride in that position?

A. As long as the tide was steady on the *in bow*, and the wind kept on the *off quarter* or *aft.* If the tide were not steady, or the wind veered on the *in quarter*, so as to force the stern from the anchor, the tide would catch the *off bow*, ease the strain on the chain, and likely cause the ship to break her sheer.

Q. If the ship broke her sheer, would she foul her anchor?

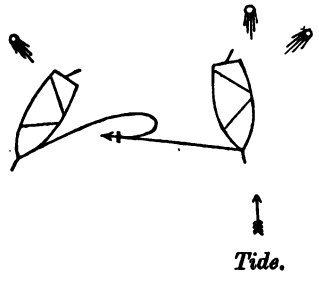
A. No.

Q. How would you act?

A. I would hoist foretopmast staysail, lee sheet aft; stand by to change the helm and haul the yards round as soon as the ship was head on to the tide again, and then lay her at the other side of her anchor. If she would not lie steady, I would steer her.

Wind as strong as the Tide.

Figures 9 and 10.



Q. You are riding weather tide, the tide eases, or the wind increases, so that the wind becomes as strong as the tide, where would the anchor be ?

A. On the lee beam.

Q. What would you do in this case ?

A. Fill the yards, and set whatever sail was necessary to force the ship ahead of her anchor.

Q. Why would you do this ?

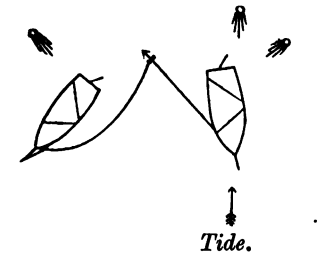
A. Because if the ship were to break her sheer with the anchor abeam, she would be in great danger of fouling it.

Q. What would you do in such a case ?

A. If I had any reason to suppose that she had fouled her anchor, I would pick it up. If she had not done so I would set her ahead at the other side of her anchor.

Wind stronger than the Tide.

Figures 11 and 12.



Q. The wind is stronger than the tide, where will the anchor be ?

A. On the lee quarter.

Q. If the ship broke her sheer would she foul her anchor ?

A. No.

Q. What would you do?

A. Hoist foretopmast staysail, lee sheet aft; stand by to change the helm, and haul the yards round as soon as the ship was head on to the tide again; and then lay her at the other side of her anchor. If she would not lie steady, steer her.

SHIP TENDING TO LEEWARD.

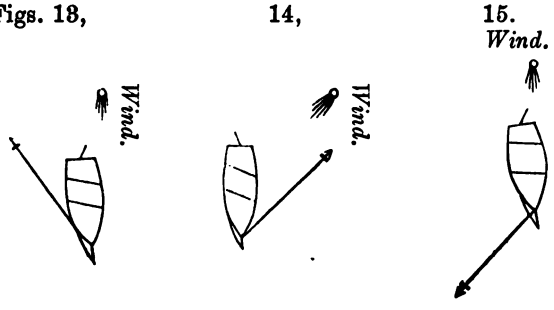
Q. The wind has been stronger than the tide, the tide is done, proceed to swing the ship?

A. Fill the yards, hoist the foretopmast staysail, lee sheet aft, when she swings so as to shake the sail haul it down, haul the yards forward, and slack away sufficient chain for the ship to ride leeward tide.

Q. Swing the ship, the tide during its strength having been stronger than the wind?

A. *If the wind were aft* (Fig. 13), keep the ship on the same side of her anchor as she had been on during the tide; when the tide eased give her a broad sheer, fill the yards and set sail sufficient to send her ahead of her anchor. When she swung, stow the sails when they begun to shake, and slack away sufficient chain. *If the wind were on the off quarter* (Fig. 14). When the tide eased a little, sheer the ship to leeward of her anchor, set sail to pass it, and proceed as before.

Figs. 13, 14, 15.

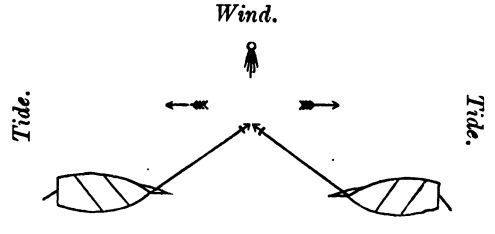


Q. Why would you sheer the ship to leeward of her anchor?

A. Because with the wind on the quarter, when the tide eases there is a risk of the ship being blown over her anchor if she be to windward, but if she be to leeward there is none.

RIDING WIND ATHWART THE TIDE.

Figures 16 and 17.



Q. You are riding with the wind athwart the tide. (Figs. 16 & 17.)

A. Give the ship a slight sheer to leeward during the strength of the tide. WHEN THE TIDE EASED. *If it were moderate weather*, give her a broad sheer, haul all the yards aback, up staysail, weather sheet over. *If it were stormy.* Point the yards to the wind during the whole tide, and keep the staysail down.

Q. Swing the ship?

A. Keep everything as it had been until she came head to wind, then change the helm, staysail sheet, and yards. When the tide came away strong, ease the helm.

HOW TO ACT WHEN THE TIDE CHANGES.

Q. The ship is riding leeward tide, the wind veers aft?

A. After the wind had veered aft, the ship would be riding weather tide, and I would act accordingly.

Q. The ship is riding weather tide, the wind draws ahead?

A. After the wind had drawn ahead, the ship would be riding leeward tide, and I would act accordingly.

HOW TO ACT IN A CALM AND SLACK TIDE.

Q. Suppose there be neither wind nor tide sufficient to keep the chain tight, so as to clear the anchor when the ship swings?

A. Always pass the anchor on the same side. If I could not, heave short.

GENERAL RULES.

Q. What are the general rules to be observed in ships at single anchor?

A. Keep a ship to leeward of her anchor as much as possible. A light ship will lie to leeward better than a loaded one.

Q. What is the general rule for a tiller?

A. Keep it pointed to the anchor.

Q. Are there any exceptions to this rule?

A. Yes, there are. The first exception is when the ship is tending to windward and swinging with her head from her anchor. The second is when she is riding weather tide and breaking her sheer. In both cases keep the tiller pointed from the anchor till the ship is head on to the tide, then in the case of breaking her sheer only, change it.

TO KNOW WHEN THE SHIP IS DRIVING.

Q. It is blowing hard: how do you know when the ship is driving?

A. If I can see two fixed objects in a line abreast of me; then if they open so that the nearest one appears to move from me, the ship is driving. Or if I put my foot on the chain and feel a trembling motion, the ship is driving. Or, if I drop the deep sea lead, or grapnell overboard, and the ship leave it so that the line grows ahead, the ship is driving,

TO EASE THE STRAIN ON THE CABLE.

Q. How would you ease the strain on the cable in stormy weather?

A. Slack away nearly as much chain as I thought it prudent to do before having to let go the second anchor, and then make top-blocks and snatch-blocks fast to the chain before the windlass and to the sampson post aft, reeve a warp in them to make a long tackle, and set all right. Or bend a strong coir cable on to the main chain before the windlass, set it tight and make it fast aft. Or make the bight of a very strong coir cable fast to each quarter, pass the ends outside, forward, and lash them to the cable chain outside of the hawse holes, ease the chain till the rope has a great portion of the strain.

SLIPPING FROM THE ANCHOR, PICKING IT UP, AND SWEEPING IT.

Q. You are riding in an open roadstead, on a lee shore, taking in cargo, it comes on to blow, proceed to slip?

A. I would take a hawser out of the quarter I intended to make the weather quarter, and bend it on to the cable chain outside of the hawse hole, haul it tight, make it fast, and bend a buoy on to the inner end. Next, pass a lanyard rope through the hawse hole and over the windlass to follow the chain, bend it on to the chain a fathom or so outside of the nearest shackle, bend a small buoy on to the other end, reef the sails and set them, ease the chain until the hawser canted the ship the right way, when all ready knock out the shackle and slip.

Q. The weather moderates, pick your anchor up?

A. I would bring up with my second anchor as near to my first as I could, hoist out my boat and get hold of both hawser and lanyard rope buoys, take the lanyard rope to the windlass, heave in the slack chain and shackle it on. If I had no second anchor, I would get as near to windward of the buoys as I could, keep just sufficient sail set to manage the ship, haul the mainyard aback, and drift broadside on to the buoys, and get hold of them from the boat.

Q. Your buoy ropes have parted, sweep your anchor?

A. Get the lead line, attach weights to sink it, get the ends into two different boats, pull in the direction of the cable chain when it was slipped. When the lead line has caught the anchor; in like manner, get hold of the anchor with a piece of rope strong enough to weigh it, bring both boats together, put both ends of the rope through a shackle, let the shackle fall down to the anchor, take both parts of the rope to the windlass and weigh the anchor.

LETTING GO THE SECOND ANCHOR.

Q. The weather is getting worse, how much chain would you have out on the first anchor before you let go the second?

A. The longer the scope on both chains, the easier the ship will ride. I would, therefore, not pay out more than 45 fathoms of the first chain before letting go the second anchor. If I went into the anchorage in a gale, I would let go the second anchor as soon as I could after the first.

RIDING BOTH ANCHORS DOWN.

Q. You are riding with both anchors down, the weather moderates, what would you do?

A. I would pick up my second anchor.

Q. Why?

A. Lest the ship take a turn with the chains; and to have the second anchor ready to let go in the best position, that is to leeward of the first, in case a gale comes on again.

Q. You are riding in an open bay, a signal is made to prepare for a cyclone; do so?

A. I would send down topgallant yards and masts, gaffs, booms, and all tophamper, close reef the topsails, reef the courses, point the yards to the wind, close reef the mizen and trysails, secure the hatches, and everything about the decks and hold, get the spare anchors over the bows, with towline or hawser chain bent to them all ready to let go when I knew how the wind was going to be, and coir springs all ready to clap on the cable chains.

Q. You are in a place where you cannot get to sea, and where, therefore, the sails are of no use, is there any other precaution that you can take?

A. Yes; if the ship be well manned, I can send down all the yards, topmasts and rigging attached.

Q. The cyclone is now upon you in all its fury, the ship is driving towards the beach, is there anything else that you can do?

A. As a last resource, to save the lives of the crew, the ship and cargo, I would cut away the masts.

MOORING—TAKING ANCHORS AWAY.

Q. Moor a ship up and down the stream with 45 fathoms of cable each way?

A. Let go the first anchor, pay out 90 fathoms of cable, pass a slip rope from aft round the second anchor shank close down to the crown, haul the anchor aft, make fast, let go the anchor and heave in 45 fathoms of the first chain. If both stopper and shank painter of the second anchor be let go at the same time, the slip rope will not be wanted.

Q. Run a kedge and warp away?

A. Place a plank, say the loose thwart across the boat's gunwale well aft, place the flukes of the kedge on the plank and the stock abaft the boat's stern, stock the kedge, bend warp and buoy rope on to it, coil the warp into the boat, leave the end on board the ship, pull away, when the warp is tight run out, lay the kedge so that it can be hove clear of the boat, stream the buoy, and heave the kedge by lifting one end of the plank.

Q. Take an anchor out?

A. Run a kedge and warp away. Lower the anchor, with its shank and stock horizontal, between two boats, place the crown towards the bows, lash the crown and ring to spars laid across the gunwales of both boats, keep the anchor nearer the larger boat, and haul it out by the warp.

The anchor may be hung to the boat's stern.

Or, it may be hung under the boat's bottom with a chain passed through the ring bolt in the boat's stern, the ring of the anchor, and the ring bolt in the boat's stem.

Or, it may be hung under the boat's bottom, by lowering it down with its shank and flukes horizontal, the flukes suspended by a long strop, in a similar manner to the lower end of an accommodation ladder, the boat's stern floated over the flukes, through the strop, and brought against the stock, the anchor ring then hung to the boat's stern and the flukes to a spar over the gunwales.

Q. How would you prevent the chain from running out too fast and damaging the boat?

A. Lash a stout spar, with the staple norman in it, across the boat's gunwales aft, take a turn with the chain round another stout spar, lash this spar across the gunwale a little abaft the body of the chain, ease away the chain and haul the boat on board.

UNMOORING.

Q. Unmoor your ship?

A. Heave the lee anchor up, cat and fish it, then heave the second anchor up.

Q. You are riding ebb tide with both anchors down, you intend to get under weigh, which anchor will you pick up first?

A. The flood anchor.

GETTING UNDER WEIGH.

Q. It comes a fair wind, ship riding leeward tide, get under weigh?

A. Heave short, loose the jib and staysail, heave the anchor up, cat and fish it, make sail.

Q. It comes a fair wind, ship riding weather tide, get under weigh?

A. Loose sails, heave the anchor up, cat and fish it, make sail.

Q. You are riding in a strong current setting right on to a shoal, or ship astern of you; a fresh breeze is blowing on to it; you are forced to get under weigh?

A. Dredge the ship clear. If I cannot do so; get a spring on to the cable, set sail and slip.

Q. It is a foul wind, the ship begins to tend to windward, get under weigh, cast to starboard?

A. Heave short, hoist main and foretopsail, haul in the port fore braces and starboard main ones, loose jib and staysail, set mizen, put the helm hard a starboard, heave the anchor up, when the main yard fills, fill the fore yard, hoist jib and staysail, cat and fish the anchor, make sail.

CLUB HAULING AND WEARING SHORT ROUND ON THE SHIP'S HEEL.

Q. You come suddenly in with the land, the ship won't stay, and there is not room to wear?

A. Supposing there be anchorage, club-haul the ship. If there be no anchorage, make a stern board, and wear the ship round on her heel.

MISCELLANEOUS QUESTIONS.

Q. State the advantages and disadvantages of having a buoy to the anchor?

A. The advantages are that the exact position of the anchor is known, so that the ship can be easily kept clear of it, and in case of slipping, or parting, it can be easily got. The disadvantages are, that in a strong tide it has a tendency to start the anchor, and in a steamer to get foul of the propeller.

Q. It is a gale of wind, you are dismasted, or your engine is broken down, cannot set sail to steady the ship, how would you act?

A. I would ride by a sea anchor made in a triangular form with three small spars lashed together, and other small spars or rope lashed across the triangle, and strong canvas fastened over all. Or ride by the middle of a large spar. Or, ride by the cable chain paid out.

Q. A ship is riding in ten fathoms, how much chain should she have out, so that the strain may be applied to the anchor in the best position for it to hold?

A. Not less than 137 fathoms.

Q. What important lesson do you derive from this?

A. That, in a gale, a ship should ride with a very long scope of chain out.

Q. Will a ship ride easier in deep or in shoal water?

A. In deep water.

Q. Why?

A. Because, when anchored in deep water the chain hangs down in a curve, and its weight draws the ship ahead, so that the chain is generally slack between the ship and her anchor, and in consequenee it acts as a spring or buffer does to a railway carriage, in easing the force of gusts of wind, or heavy seas striking the ship.

Q. What precautions should be taken with the cable chain?

A. It should occasionally be got on deck and examined, and the shackles put in order. Shackle pins should be carefully fastened, as they sometimes work out.

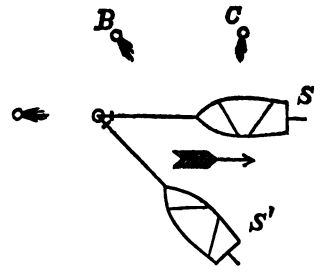
REMARKS.

The Examiner places a model of a ship at anchor on the table and asks the candidate how he would act in different cases.

Thus, he may take a particular case as follows, and say, "Suppose your ship were at anchor in a roadstead, say the Downs, at the time of, say high water, the wind having been on, say, your starboard bow, while riding flood tide, how would you swing your ship?"

The answer to this question will depend on the strength and direction of the wind and tide.

For example, in the adjoining figure, let the brush at A represent the direction of the wind through the roadstead; that at C the wind blowing off the land; and that at B the wind blowing in a direction between those of A and C; let the arrow represent the flood tide, and S the ship riding flood. When the wind is anywhere between the directions A and C, as soon as the tide eases the ship will swing into the position S'. And when the wind is anywhere between the directions A and B, it will generally be better to fill the the fore yard, haul the staysail sheet aft, sail the ship over, and pass to windward of the anchor. But when the wind is anywhere between B and C it will be better to haul the fore yard aback, weather stay sail sheet aft, and pass to leeward of the anchor.



If the wind be blowing very hard, or the tide weak, the ship, especially if light, may not tend to windward at all.

A very experienced gentleman told the author that the candidate should consider the ship to be under weigh, and the anchor to be a shoal he wanted to avoid, and act accordingly.

The author thought it advisable to have the benefit of the opinions of experienced men on the preceding article, he therefore submitted it to Captain John Lindsay, for 45 years master in active service, and to the author's brother, Captain Stephen Bergen, for 35 years master in active service. The author tenders his thanks to these two gentlemen for several valuable corrections and suggestions. Captain Lindsay mentioned instances of the benefits he has seen from springs on the cables when the ship was riding out a cyclone; he also mentioned an instance of a ship riding remarkably easy with one anchor down, and both cables shackled together and paid out. Captain Stephen Bergen mentioned an instance of a ship riding very heavy with both anchors down; one of the chains broke, and then the ship rode much easier. In the opinion of the author, this would arise from one of the anchors bringing the ship up suddenly when a heavy sea struck her, but when the chain broke the ship would yield to the force of the sea until it was exhausted.

Exn. 9 b. *Port of*.....

Rotation.

EXAMINATION IN CHART.

The applicant will be required to answer in writing, on a sheet of paper which will be given him by the examiner, all the following questions according to the grade of Certificate required, numbering his answers, with the numbers corresponding with those in the question paper.

1.—A strange chart being placed before you, what should be your special care to determine, before you answer any questions concerning it, or attempt to make use of it?

2.—How do you ascertain that in our British charts?

3.—Describe how you would find the course by the chart between any two places, A and B.

4.—Supposing there to be 2¼ points of west variation at the first-named place, what would the course be magnetic? *the true course being N.E. ¼ N.*

NOTE.—In answering question 4, Variation East allow to left hand, Variation West allow to right hand.

5.—How would you measure the distance between those two or any other two places on the chart.

6.—Why would you measure it in that particular manner?

The above comprises all the questions on the chart that are put to Mates and only Mates.

In addition to the above, the Masters are required to answer:

7.—What do you understand those small numbers to indicate that you see placed about the chart?

8.—At what time of the tide?

ANSWERS TO EXAMINATION IN CHART.

1.—Which is the north part of the chart.

2.—In our British charts there is always at least one compass, the true north point of which is designated by a star or other ornament.

3.—I would lay the edge of a parallel ruler over the two given places, A and B, then taking care to preserve the direction, I would move one edge of the ruler until it came over the centre of the nearest compass on the chart, the circumference of the compass cut by the edge of the ruler would show the course according to the direction the one place is from the other.

4.—2¼ points of West variation should be allowed to the right hand, and the magnetic course would be NE by E ¼ E.

5.—I would measure one-half the distance on the chart by my dividers, then placing one leg of the dividers on the middle latitude, I would measure on each side of the same, and the distance measured between those two extreme points would be the distance.

6.—Because on a Mercator's chart the degrees of latitude increase as you approach the poles.

7.—Depths of water in fathoms, sometimes in feet.

8.—At low water at ordinary springs.

9.—What are the requisites you should know in order that you may compare the depths obtained by your lead-line on board with the depths marked on the chart?

10.—What do the Roman numerals indicate that are occasionally seen near the coast and in harbours?

11.—How would you find the time of high-water at any place, the Admiralty tide-tables not being at hand, nor any other special tables available?

All the above questions should be answered, but this does not preclude the Examiner from putting any other questions of a practical character, or which the local circumstances of the port may require.

9.—The time of the tide and the "rise and fall," or as it is now called the "mean spring range."

10.—The time of high water at that place at full and change of the moon.

11.—To the time of high water at full and change I would add 49 minutes for every day that has elapsed since the full or change of moon, the sum would be the P.M. tide for the given day approximately; or, to the time of the moon's meridian passage, corrected for Longitude, add the port Establishment, the sum would be the P.M. tide required.

MISCELLANEOUS QUESTIONS.

Q. A barge containing a cable chain comes along side, which end would you put on to the anchor?

A. Put that end on to the anchor which will make the bend of the shackles go out of the hawser pipe first.

Q. What will you do with the other end?

A. Secure it to the mast, keelson, beam, or shackle it to the other chain.

Q. You are by the wind and make the land suddenly about half a cable's length ahead, what would you do?

A. Try to stay the ship, if she miss stays, haul all the yards aback, wear her short round on her heel, and change the helm for a stern board.

Q. You are riding in a roadstead, there is a sea on, a lighter deep load comes alongside, how would you get the cargo on board?

A. Clap a spring on the cable, heave the ship broadside on the sea, and moor the lighter at the lee side.

Q. You are taking in timber at a bow port in an open roadstead; or in a tide way.

A. Take the cable chain in at one quarter, and a hawser chain fast to the cable at the other.

Q. You are becalmed, the ship is forging ahead towards the land, a swell is setting her towards it; can you do anything to keep her off?

A. If in anchorage, let go the anchor, if the water be rather too deep for the anchor, let go the big kedge with the hawser chain fast to it; if not in anchorage, and the sea be not too heavy, hoist the boat out and tow the ship's bow off the land.

Q. While your bow is towards the shore, a light breeze comes on your off quarter, get your bow from the land as soon as possible?

A. Put the helm down, haul out the mizen, haul the boom and gaff into 'midships, brace the main yard up, haul and keep the head yards lifting full, haul the jibs and staysail down.

Q. You are sailing up and down a river, it is nearly a calm, the ship won't steer.

A. Get a boat ahead and tow the ship as may be required.

Q. There are ships ahead of you at anchor, you cannot clear them?

A. Let go the anchor and dredge clear of them.

Q. You are at sea, becalmed, a weak current is against you, there are 30 or 40 fathoms of water?

A. Let go the big kedge with a hawser chain fast to it.

Q. You keep Whitby Lights in one, where will they lead you ?

A. On the Scar Rock.

Q. You are going into the Downs, it is rather hazy, you see no other lights except the South Foreland; how do you keep the ship off the land ?

A. Keep the lights in sight above the edge of the cliff.

Q. When would you anchor ?

A. I would keep the South Foreland Lights bearing S.W. ½ W. keep the lead going, anchor as soon as the ship was sheltered from the sea until the weather cleared up.

Q. It is clear, when would you anchor ?

A. Supposing the East Goodwin Light visible, bring it to bear E by S ½ S and the South Foreland SW ½ W, bring up in 8 fathoms.

Q. You are lying to, your topsails blow away ?

A. Set the close-reefed main staysail, or mizen.

Q. It is a very heavy gale, all your sails blow away ?

A. Spread a tarpaulin, or a bolt of canvass up the mizen rigging.

Q. You see a light just dipping, you know that it is either Portland or the Casquets, from the distance and state of the atmosphere, you cannot make out whether it flashes, or how many there are ?

A. Determine which lights they are by their bearings, and by sounding.

ADDITIONAL FOR FIRST MATE.

OFFICIAL LOG BOOK.

REMARKS.—A first mate must be able to make the entries in the official log book.

He must insert the ship's draught of water when load, and the clear side from the water's edge to the lowest part of the deck.

Q. What is the official log book, and what is it for ?

A. It is a book in a form sanctioned by the Board of Trade. It is to make entries concerning the ship's crew and passengers.

Q. When must the entries be made ?

A. As soon as possible after the occurrence to which it relates.

Q. What is the latest time that the entry can be made ?

A. Twenty-four hours after the arrival of the ship at her final port of discharge.

Q. How is the entry to be made ?

A. The entry should be made by the master, signed by him and the mate, or one of the crew.

Q. What must be done if an entry is made concerning one of the crew?

A. Read the entry over to the man, and, if he makes any reply, enter and sign it also.

Q. If a seaman dies, what entry is made concerning him, his wages, and effects?

A. Cause of death, medical treatment, statement of his wages and effects. Every entry of illness, injury or death, must be signed by the surgeon, or medical practitioner on board (if any).

Q. What is done with the effects?

A. They may be sold, and a statement of every article, with its price, entered in the official log.

Q. What is done with the money and effects if they are left unsold?

A. Make an inventory of them in the official log and deliver them to the shipping master at the final port of discharge in the United Kingdom.

Q. What is done with the official log book at the end of the voyage?

A. It is delivered to the shipping master within 48 hours of her arrival, or when the crew are paid off, whichever happens first.

Q. Give a short statement of the principal entries?

A. Ship's name and official number, Master's name, voyage. List of crew, conduct, offence, conviction, punishment, sickness, medical treatment, and death, of any of the crew. Wages of men entering the navy, Wages and sale of the effects of any man that has died. Births, marriages, collisions, survey and naval court.

Q. There is a fly leaf of blue paper in your official log book for reporting outward-bound ships when you arrive at home. What is done with it?

A. On arriving at port fill it up and send it to the Registrar-General of Seamen.

Q. What is the course from Souter Point to Flambro' Head?

A. SSE, nearly, to Whitby; then S by E ¼ E to Flambro' Head.

Q. From Flambro' Head to the Dudgeon?

A. S by E ¼ E.

Q. From the Dudgeon to midway between Cromer and Hasbro' Light Ship?

A. S by E ⅜ E.

Q. Through the Downs?

A. SW ½ W through the Gull stream, then SSW to near the South Foreland.

ADDITIONAL FOR MASTER ORDINARY.

SHIP'S BUSINESS. AT HOME PORT.

Q. What are the first things you do on being appointed master?

A. Generally speaking when there is a change of master the ship is in an English port, and there is no official log on board; but if she be in a foreign port, get my name put on the register, and get all the ship's documents from the previous master, and enter a list of them in the official log; both I and the previous master must sign the list.

Q. What is a Charter Party?

A. A written or printed contract between a merchant and his agent, and a shipowner or his master, for the employment of a ship.

Q. Is there any precise form of charter?

A. No. The master usually states the name of the ship, nationality, class, if coppered, whether sailing ship or steamer, registered tons, name of master, and where the ship is.

Q. What covenant does the master make?

A. That the ship is tight, staunch, and strong, and every way fit for the voyage.

Q. What does he allow the merchant?

A. A certain number of days called *lay days* to load and unload the cargo; and, if required, a certain number of days called *demurrage days*, for which he is to be paid extra.

Q. What else does he agree to?

A. That as soon as the ship is load, she shall proceed on her voyage with all convenient speed, and on arrival at her port, or *as near thereto as she can safely get*, he will there deliver his cargo to the merchant or his agent. The perils of the sea and other dangers excepted.

Q. What are those exceptional dangers?

A. The Act of God, the Queen's Enemies, Restraints of Princes, Pirates, Fire, and all and every other Dangers, or Accidents of the Seas, Rivers, Navigation, of what nature and kind soever, during the said voyage, being always excepted.

Q. What does the merchant agree to do?

A. To load the ship with a *full and complete cargo*, to load and unload the ship within her lay days, or to pay demurrage, and to pay a certain sum called freight for the use of the ship.

Q. Is there any penalty for non-fulfilment of the charter by either party. If so, what is it?

A. Yes. It is generally the estimated amount of freight.

Q. What makes the charter legal?

A. The stamp and signatures of the parties and witnesses.

Q. What makes the charter binding?

A. The penalty.

Q. Does the charter state the mode of payment?

A. Yes.

Q. What is done with the charter?

A. The original charter must be stamped, and it is left in the hands of the broker, who gives the captain a certified copy of it, which should also be stamped.

Q. What is done with the charter in some foreign countries?

A. It is necessary to employ a sworn broker, who affixes his seal to the charter, otherwise it is not a legal document, and cannot be used in a court of law.

Q. What must be done by the last person who signs the charter?

A. He must cancel the stamp by writing his name, or the name of his firm, together with the true date of writing the same, across the stamp.

Q. Must there be witnesses to the signatures of the parties?

A. Yes. If both parties sign at the same time one witness is sufficient. If they sign at different times there must be a witness to each signature.

Q. In the event of a dispute between the parties, what must the broker do?

A. Produce the original stamped charter in a court of justice, in case the captain's copy is not stamped.

REMARKS.—Cargoes are often sold while in the ship. In this case, the merchant transfers the charter and other documents to the purchaser, and the captain must carry out the agreement with the person who has bought the cargo.

"The Stamp Act, 1870," came into operation on the 1st of January, 1871. Except where otherwise provided by special enactment, an unstamped, or insufficiently stamped, instrument may be stamped after execution, on payment of the unpaid duty and a penalty of £10. If an instrument has been executed out of the United Kingdom, it may be stamped within two months after it has been first received in the United Kingdom, without penalty; and the Commissioners of the Inland Revenue may remit the penalties at any time within twelve months, on sufficient grounds to justify the exemption.

Instruments executed in the United Kingdom, except in criminal proceedings, are "not to be pleaded or given in evidence, or admitted to be good, useful, or available in law or equity," unless stamped according to the Act.

By section 24, any instrument upon which the duty is required to be denoted by an adhesive stamp, is not to be deemed duly stamped unless the person last signing the document cancels the stamp by writing his name, or the name of his firm, together with the true date of signing the same, across the stamp.

In this new Act, a charter party is defined to be:—Any agreement or contract for the charter of any ship or vessel, or any memorandum, letter, or other writing between the captain, master, or owner of any ship or vessel, and any other person, for or relating to the freight, or conveyance of any money, goods, or effects on board of such ship or vessel." If the duty on a charter party be not denoted by a stamp, it must be stamped by an impressed stamp, within seven days after the first execution, on payment of the duty and a penalty of 4s. 6d., and after the expiration of seven days, but within one month, on payment of a penalty of £10, and cannot in any other case be stamped. If the charter has been executed out of the United Kingdom, either party thereto may, within ten days after its receipt, and before it has been executed by any person in the United Kingdom, affix an adhesive sixpenny stamp, and if such stamp be cancelled properly, the instrument is to be deemed duly stamped. Any number of copies of a charter party may be made; but if they be signed by the original parties to the conditions, they must be stamped, in accordance with the law, in a given time, or they cannot be produced as evidence in court.

Copies of the charter parties attested, or in any manner authenticated, and not bearing the signature of the contractors, may be stamped within fourteen days of attestation, and presented as evidence, if the original was duly stamped. Thus, for example, if a charter party be entered into and completed, copies of the same may be made out by a clerk, compared and witnessed by a second person, and sent to be stamped on payment of the sixpenny duty only per copy, within fourteen days.

An attested copy of any stamped instrument being admissible in court, it is advisable when large transactions have been entered into, for each party to a charter to possess a properly stamped copy of the agreement. Captains too commonly sign a charter party, and are then furnished with a copy which has neither been certified as attested nor stamped. These last-mentioned copies of the terms of a charter are useful for keeping a captain informed of the terms of his agreement; but in the event of a lawsuit, the want of a duly-stamped charter, independent of that in the possession of the broker, is sometimes a source of trouble and expense.

TERMS OF CHARTER.

Q. Suppose a charter be offered to you for a port with which you are unacquainted?

A. Ascertain if the season and winds be favourable, if there be water for the ship, if the port be accessible, what the customs and expenses of the place are, how the goods are loaded, if the merchant be respectable; and so on.

Q. Suppose that freights are plentiful, so that you can make good terms, what clause would you have with respect to lien on cargo?

A. Ship to have a lien on the cargo for freight, dead freight, and demurrage.

Q. What clause with respect to bringing the cargo to the ship and taking it away?

A. Cargo to be brought alongside the ship and taken from her side at merchant's risk and expense.

Q. What is the afloat clause ?

A. Ship to load and unload where she will lie afloat at all times of tide.

Q. What is the ice clause ?

A. In case of ice beginning to form before the ship is load, vessel to be at liberty to proceed with what cargo she may have in.

Q. Suppose you are bound to a port that is frozen in winter, and you think that ice will have formed in the inner harbour before you arrive there, or before you have time to discharge there ?

A. At a certain date, or before that date, if there be ice in the inner harbour, ship to discharge in the outer harbour, before entering the inner harbour.

Q. Would you allow "Working days" to be inserted in the charter?

A. No. I would insert "Running days," even if I had to allow more of them.

Q. Would you allow the phrases, "Sundays and holidays excepted," or "Weather permitting?"

A. I would not.

Q. Would you allow the clause, "Freight to be paid by a good bill?"

A. No. I would insert it thus:—"Freight to be paid by a good and approved bill on London."

Q. What is a good and approved bill ?

A. A banker's bill.

Q. Would you allow the clause, "Cash at the usual rate of exchange ?"

A. No. I would stipulate the exact rate of exchange ; or insert the clause thus :—"Cash at the current rate of exchange."

Q. You are chartered for a lump sum ?

A. Limit the ship's draught of water.

Q. Would you allow the charterer to sign as agent ?

A. Not unless I approved of his principal.

Q. Would you agree that the ship shall load or discharge in turn, or that the charterer's responsibility shall cease when the cargo is shipped, or that he shall not be liable for any delay in loading or discharging ?

A. I would not agree to any of these things.

Q. If a charter be offered with the clause : "The captain to sign bills of lading as presented to him by the charterer's agent, at any rate of freight, without prejudice to this charter." What would you do ?

A. I would write, "Provided the rate of freight in the bill of lading is not less than the rate in the charter party."

REMARKS.—In a case which occurred to a ship chartered at Calcutta for London, at about £3 10s. per ton, the bills of lading were presented to the captain for signature at 1s. per ton; he signed those bills of lading, and the consignee refused to pay any more. The owners brought an action against the consignee, which they lost, and had to pay a very large sum for law expenses, besides losing above £3 per ton on the freight.

Q. What is the meaning of the phrase, "Without prejudice to this charter?"

A. It means that if the shipper present bills of lading for signature at a less rate than the charter, the consignee is not liable for the difference, but the charterer is liable.

Q. If a charter be offered to a "safe port," on, say the East Coast of England, what would you do?

A. Mention the name of all ports I am willing to go to.

Q. Would you agree to sign bills of lading "Without qualification;" or would you allow the clause, "or other lawful merchandise?"

A. I would not.

Q. When an advance of freight is to be paid, when would you make it payable?

A. On signing Bills of Lading; not on the sailing of the ship.

Q. In a charter entered into abroad for a cargo to be discharged in the United Kingdom, what would you stipulate with respect to payment of freight?

A. Freight to be paid on delivery, in cash.

Q. Would you get the name of the party who has to load the cargo written on the charter by the merchant?

A. Yes.

Q. Would you allow address commission?

A. Not if it could be avoided; but if it could not be got clear of, stipulate the exact rate per cent. on the charter.

Q. Would you allow the phrases, "Paying the usual commission," or "on the usual terms?"

A. No. I would stipulate the exact commission and the exact terms.

Q. If the clause "According to the custom of the port," is in your charter, what would you do?

A. Ascertain what the custom of the port really is.

Q. What special clauses would you have for a steamer?

A. Accidents to boilers and machinery excepted.
Liberty to call for coals.
Liberty to tow, or be towed.

Q. Would you sign an open charter?

A. Not if I could help doing so. I would have the cargo named.

Remarks.—It is too often the case that an open charter is signed by the captain or owner, with the expectation of loading a cargo for which a good freight is stipulated, instead of which a cargo is supplied by the merchant, for which a bad freight is paid.

Q. What do you do after chartering?

A. Prepare my ship for cargo; dunnage her; proceed to my loading berth; give the merchant written notice that the ship is now ready to load, and that to-morrow will be my first lay day. Copy this notice into the ship's log.

Q. Your lay days will expire the next day, the ship is not load?

A. Give the merchant written notice that to-morrow is my last day, and that afterwards the ship will be on demurrage.

Q. How do you claim demurrage.

A. Daily. And on Saturday for the next day, Sunday.

Remarks.—The author is not aware of any law to claim demurrage in this manner, and does not think it absolutely necessary.

The examiner may hand a charter, bill of lading, bill of exchange, or other documents to the candidate, and ask him to explain them.

RESPONSIBILITY.

Owners, captains, and mates of ships are considered in law as common carriers. The law holds the shipowner liable for the safe custody of the goods, when properly and legally received on board in good order, and for the delivery to the person producing the bill of lading.

It is therefore necessary that all due precautions be taken to receive cargoes, and stow them in good order, and to deliver them in like good order.

All goods must be received according to the custom of the port where they are loaded, unless specially agreed on to the contrary; and the same custom will regulate the commencement of the responsibility of the captains and owners. In some cases, the responsibility commences when the goods are on board of the ship; in others, when the ship's purchases are on them; in others, when they are laid on a wharf alongside of the ship, and the mate has signed a receipt for them.

Owners are liable for losses by thieves, fire, unjust seizures, and so on, though they themselves are not in fault, unless they have protected themselves, by introducing into their charter and bill of lading exceptions as to those matters.

BILL OF LADING.

Q. What is a Bill of Lading?

A. A receipt signed by the master for goods received on board of a ship.

Q. What does it state ?

A. Ship's name, shipper's name, master's name, kind and quantity of cargo, where shipped, where to be discharged, that it is in good order, and has to be delivered in the same good order, the perils of the seas excepted ; to the merchant's agents, he paying freight, *demurrage and all other conditions* as per charter party.

Q. How many are there, and who gets them ?

A. Three, four, or six in a *set*. The merchant retains one, sends one to his agent, and gives one to the master. At Cronstadt, and some other places, the master must produce two.

Q. Must the bill of lading be stamped ?

A. In England, every bill of lading of a set requires a sixpenny stamp before being signed, under a penalty of £50. Any more copies may be taken without being stamped.

Q. What should be done before signing bills of lading ?

A. Get back the mate's receipts, and keep them as a check against him until the cargo is discharged.

Q. The mate's receipts show less cargo than the bills of lading do ?

A. Insert a clause, " So much cargo in dispute, if on board to be delivered."

Q. The merchant won't allow you to insert this clause ?

A. Sign under protest.

Q. The merchant won't allow you to sign under protest ?

A. Fill up bills of lading of my own, sign them, present them to the merchant, and sail.

Q. What can the merchant do in this case ?

A. After I arrive at my discharging port, he can make me prove that I have discharged all I took in.

Q. Anything else ?

A. Qualify my responsibility, and write such words as will shew that I have no other knowledge of the goods than that which is obtained from their outside appearance.

Q. Suppose the cargo consist of iron, coal, &c.

A. Write " *Weight unknown.*"

Q. Grain, seed, &c. ?

A. " *Quantity and quality unknown.*"

Q. Bales of hemp, flax, &c.

A. " *Contents unknown,*" or " *Weight and contents unknown.*"

Q. A number of pieces in bales of manufactured goods ?

A. " *Number of pieces and contents unknown.*"

Q. For liquids in cask?

A. "*Contents unknown,*" and "*Not accountable for leakage or deficiency in casks.*"

Q. For liquids in bottles?

A. Add: "*Not accountable for breakage.*"

Q. If the number of gallons be expressed in the bill?

A. Add: "*Number of gallons unknown.*"

Q. For crates of glass, earthenware, or other brittle goods?

A. "*Contents unknown.*" "*Not accountable for breakage.*"

Q. For iron goods?

A. "*Not accountable for rust.*"

Q. For goods liable to damage by rats and other vermin; or to deteriorate during the voyage?

A. "*Not liable for damage by rats and other vermin; nor for deterioration.*" And so on, according to the cargo.

Q. If a merchant wish you to take damaged cargo on board and promise to give you a Deed of Indemnity for to sign bills of lading for a "cargo in good order," what would you do?

A. Refuse to take it on board, for it would be conniving at fraud.

Q. If a merchant wish you to sign bills of lading before a cargo is on board, what would you do?

A. Refuse to do so; for the merchant might fail, or the goods might take fire, or be lost, so that they might never be shipped. Sign for the portion of the cargo actually on board.

Q. Bills of lading in a foreign language, which you do not understand, are presented to you for signature?

A. Get them translated, or write, "All conditions as per charter; everything contrary thereto to be null and void."

Q. If a merchant from any cause wish his goods to be unshipped at the port of loading after they have been shipped, what must he do?

A. He must pay the full freight the ship would have earned had she proceeded to her discharging port with the goods; he must also return the bills of lading to the captain, or, if he fail to do so, he must give the captain a deed of indemnity against all claims for the goods from the holders of the bills of lading.

Q. The ship is nearly load. What should you do?

A. Have the water, provisions and stores on board. I and my mates produce our certificates at the shipping office, and sign the crew on the articles to be on board at a certain date, so that the ship may not be detained after she is load.

Q. What clause should you be careful to insert in the articles?

A. The ship's draught and clear side in feet and inches.

Q. What documents do you get from the shipping office ?

A. Articles. E.N.G., or Return List. Papers for account of men's wages. Official Log Book. AA. Receipt for Engagement Fees.

Q. You are load ?

A. Take all my papers to my broker, who goes with me to the Custom House, pays my charges, and gets my papers, including a Bill of Health, which is taken to the consul of the country I am bound to, and who vises it, that is, certifies that it is correct.

Q. What documents do you take to clear your ship, outwards, at the Custom House ?

A. Content and Cocket Card. Ship's Register. Last Light Bill. Clearance from Shipping Office called AA. Manifest of Cargo. Specification of Cargo. Jerking note.

Q. What document do you get at the Custom House after you clear your ship outwards ?

A. Port clearance and Dock Pass.

AT SEA.

Q. What next ?

A. Get a pilot. Proceed to sea with all convenient speed, *wind and weather permitting.*

On getting outside, muster the crew. If any missing ship substitutes. Send an account of them to my owner, and to the shipping office. Make the scale of provision accessible to the crew.

Q. What document do you send to the shipping office after you ship substitutes ?

A. A document called E.N.G. 2 ; or return list.

Q. What precautions must you take concerning the provisions of the crew ?

A. Have proper weights, scales and measures, to weigh and measure them ?

Q. By what route do you proceed on your voyage ?

A. By the customary safe route.

Q. What is the consequence if you deviate from that route ?

A. The underwriters are not liable to pay insurance if the ship be lost.

Q. Will anything justify you for deviating?

A. Yes. Stress of weather. Damage. Leak. To join convoy. To avoid an enemy, or a pirate. And motives of humanity.

Q. What means would you use for the prevention of scurvy among the crew at sea ?

A. 1. Commence serving Lime or Lime Juice out when salt provisions are first issued.

2. Serve out Preserved Vegetables.
3. A plentiful supply of good water.
4. Attend to cleanliness and ventilation, more particularly in the quarters of the crew.

Q. If in port?

A. Have a full supply of vegetables, namely, Potatoes, Onions, Greens, Radishes, and especially Watercresses.

Also Fruits: as Oranges, Limes, &c.

Q. A man is suffering from scurvy, and his daily allowance of lime juice does him no good?

A. Double his allowance, and give him fresh, or preserved, provisions.

Q. You have to discharge in several ports. In what order will you call at them?

A. In the order named in the charter. If not named, in geographical order.

Q. You fall in with a heavy storm, which damages the ship and drives you into an intermediate port. Ship making a great deal of water, likely to damage cargo?

A. The port authorities would likely be alongside before I was moored. Report to them. Engage men and lighters, or whatever was necessary to pump the ship, or to discharge the cargo, so as to avoid damage if possible.

If necessary, warehouse the cargo in my own name, open bales and dry them, or do whatever is necessary to preserve the cargo.

Q. What next?

A. Report to my consul, note a protest, and call a survey by two competent persons—generally two shipmasters.

Q. What next?

A. Send telegrams to my owner, underwriters, and merchant. If the damage were serious, wait their instructions, if there were a prospect of getting them in a reasonable time.

Q. In an emergency are you justifiable in acting as a sensible man would do in case the property were his own?

A. Yes, first, prevent further damage, and then get reports and surveys in order, and send them to my owner.

Q. You receive instructions to act as in your own judgment is best for all parties?

A. I would act as if the ship were my own and uninsured.

Q. Suppose repairs could be efficiently done at a reasonable cost?

A. I would repair the ship, take in the cargo, and proceed with it.

Q. If they could not be efficiently done, or the cost were unreasonable?

A. I might think it best to engage another ship to take the cargo on, and go myself to another port for repairs.

Q. In this case would the full freight be due to the owners, whatever freight you might pay to the other ship?

A. Yes.

Q. If the ship were so much damaged, that the repairs would cost more than she would be worth after being repaired.

A. I would sell her as a wreck.

Q. If you could not get another ship to take the cargo on, and it were not a perishable one?

A. I would leave it in the hands of a responsible person, to wait instructions from a merchant.

Q. If it were perishable?

A. I would sell it.

REMARKS.—Our English Judges hold that it is the duty of the captain to take the cargo on to its destination; or if his ship be so much damaged that he cannot do so, then he may tranship it. Nothing but the greatest necessity will justify the sale of the cargo; no recommendation of surveyors, or decree of foreign court will do so; nothing but such a necessity as supersedes all human laws will do it.

The captain is agent for all parties, and will be justified in doing what a prudent and sensible man would consider best for all parties.

Q. In case of wreck, what is the duty of the master?

A. To save as much of the wreck, stores, and cargo as possible, and his crew must assist him. He must communicate with his owner and underwriters before selling either wreck or cargo. He must also have surveys and protests in proper order to send to his owner.

RAISING MONEY FOR REPAIRS.

Q. Your ship is repaired. How would you get money to pay for the repairs?

A. Draw a bill on my owner. If my owner were not known, and my own credit good, give my own acceptance. In both these cases, especially the last, shew in the bill that the money is necessary for the use of the ship. If I do not I will be liable.

Q. You cannot obtain money by bills. You are so situated that you cannot obtain money from your owner?

A. Get money on a *Bottomry Bond.*

Q. What is a bottomry bond?

A. A bond *entered into by the master* giving the ship as security for money advanced to him.

Q. What justifies a master for giving a bottomry bond?

A. When he has no other means of raising money to pay for repairs, or necessaries to enable the ship to continue her voyage.

Q. Can the money so advanced be spent in any other way than for repairs or necessaries for the ship?

A. No, it cannot.

Q. How do you get a bottomry bond?

A. Advertise, and take the lowest tender.

Q. You cannot obtain sufficient money on a bottomry bond?

A. *Hypothecate;* that is, give security on the cargo.

If necessary, sell *part* of the cargo.

Q. What is this called?

A. *Respondentia.*

Q. The ship receives further damage on her passage, and has to put into another port for fresh repairs?

A. The master may enter into another bottomry bond; and on arrival the last bond must be paid first.

Q. What is the reason that the last bond must be paid first?

A. Because without it the ship would not earn the money to pay the first bond.

Q. Can the master of an English ship legally obtain money on a bottomry bond in England?

A. No.

Q. When must the money received on bottomry be paid?

A. As soon as convenient after the arrival of the ship in port.

Q. Is there anything payable before a bottomry bond?

A. Yes. Seamen's wages.

Q. If the ship be lost, what is the consequence to the lender of the money?

A. He loses it, both principal and interest, and therefore demands a higher rate of interest than is usual in the ordinary course of business.

Q. If the ship be within reach of a telegraph station, what must you do before getting a bottomry bond on your ship?

A. Send a telegram to my owner.

MORTGAGE. LLOYD'S AGENT. JETTISON. BARRATRY. GENERAL AVERAGE. PARTICULAR AVERAGE. WARRANTY. INVOICE. MANIFEST. SURVEY. PROTEST. SALVAGE.

Q. What is a *Mortgage?*

A. It is a deed *entered into by an owner* in which he gives the ship as security for money advanced to him.

Q. Can he do what he likes with the money ?

A. Yes, he can.

Q. How does he pay it back ?

A. According to the terms of the deed.

Q. In case of difficulty, can *Lloyd's Agent* act without your consent?

A. The master alone is agent for all parties concerned; neither Lloyd's agent, nor any other person, except his owner or underwriters, can supersede him, without he misconducts himself.

But Lloyd's agent being generally an experienced man it is well for the master to avail himself of his services.

Q. What is a *Jettison ?*

A. It is a voluntary throwing overboard of any part of the cargo; or the cutting, or casting away, of anything belonging to the vessel. To render the action warrantable, it should be done in a storm to lighten the ship, or after getting aground, for the purpose of getting the ship off, its object being the preservation of the crew and vessel.

Q. What is *Barratry ?*

A. When the master, officers, or crew of the ship rob the owners or assurers;

When a ship is taken from her proper tack with evil intent;

When a ship leaves port without paying dues :

These crimes being done without the owner's consent, the offenders are said to be guilty of barratry.

Q. What is *General Average ?*

A. When part of the property is sacrificed voluntarily, not accidentally, or money paid, for the purpose of saving the remainder of the property, and by such sacrifice the master succeeds in saving it, the property saved is said to be subject to General Average.

Q. Give some instances of general average ?

A. A ship is riding at Odessa Mole Head in a gale, alongside of other ships, the spare sails, towline, and warps are put over for fenders, and destroyed. A ship at anchor is likely to be fouled by another driving, and therefore slips. A ship is likely to capsize in a squall, and therefore cuts away the masts. A ship is likely to founder, and therefore throws part of the cargo overboard. A master is forced to sell part of the cargo for the purpose of repairing the ship and taking the remainder to port. The loss caused by any of these things would be a subject of general average.

Q. Who or what pays for the loss by general average ?

A. The cargo, the ship at the end of the voyage, and the freight, less wages and expenses, each pay in proportion to their value.

Q. Do the victuals and wages contribute ?

A. They do not.

Q. What is *Particular Average?*

A. When a portion of the property, either ship or cargo, is damaged or destroyed, but not sacrificed, to save the remainder, the loss comes under the head of Particular Average. In particular average, each party pays for his own loss. At Lloyd's the amount of damage must amount to three per cent. of the whole, unless it arise from stranding.

Q. Two ships are at anchor in Yarmouth Roads, it is a gale of wind; one of them *breaks* her chain and is likely to drive athwart the other, which, seeing the danger, *slips* to avoid collision, both ships lose an anchor and chain; does the loss come under General or Particular Average?

A. The ship which slips comes under General Average, the one which breaks adrift comes under Particular Average?

Q. What is *Warranty?*

A. In a policy of insurance, it is a condition, either expressed or implied, to meet certain contingencies that may arise during the voyage. Thus a vessel must not deviate; she must be seaworthy, and all reasonable care must be used to guard against risk.

Q. What is an *Invoice?*

A. An Invoice is an account of the cargo sent by the merchant to his agent. It contains a description of the goods, and their marks and numbers, if any; also the cost and charges, such as freight and insurance, upon them.

Q. What is a *Manifest?*

A. A Manifest is a statement, signed by the master, giving full particulars of the cargo; where, when, and by whom shipped; and to where and whom consigned.

A list of stores has sometimes to be given, and an account of the names of the crew.

Q. What is a *Survey?*

A. It is an examination of damage to ship or cargo by two or more competent persons. Shipmasters, Engineers, or Merchants according to the damage done to ship, machinery, or cargo. They give a written report on the case, and if repairs have been effected, they should report that such is the fact. In case of damage to ship, it is advisable to have carpenters in addition to masters on the survey.

Q. What is a *Protest?*

A. In case of ship or cargo happening any damage, or of the merchant failing to fulfil the charter in any respect, a protest or statement must be made before the British Consul abroad, or before a Notary Public at home.

Q. What must the document state?

A. It must give the particulars of the case, and must protest against any loss that may happen to the ship.

Q. When a ship has a perishable cargo, what must be done on arrival?

A. A protest ought to be noted—that is, a short statement should be made specifying the ship's name, cargo, where from, and date of sailing, and protesting against any loss to the ship from damage that may have happened.

Q. When the extent of damage has been ascertained what must be done ?

A. The protest must be extended,—that is, full particulars of any bad weather that may have been experienced must be given from the log-book, and the officers must witness to the truth of the statement.

Q. What is done with protests in some foreign countries ?

A. It is necessary to note and extend the protest at the same time.

Q. In order that a protest may be made out correctly what must the mate do ?

A. Be careful to fill the log-book properly up.

Q. What is a *Derelict* ?

A. A ship abandoned at sea by the crew.

Q. What is *Salvage* ?

A. It is money paid for saving ship or cargo when in great danger.

AT A FOREIGN PORT.

Q. You are off your port ?

A. Hoist my ensign, and jack also for a pilot. He will take me into port and give me information about the Port Authorities, who will most likely come on board before, or as soon as, I am in port. Answer any questions they may put to me, and produce my papers they require to see. If I have a clean bill of health they will likely give me pratique; that is liberty to go ashore.

Q. What papers do you require ?

A. Bill of health, manifest, articles, and list of stores.

Q. What next ?

A. Take my articles to my consul. Then engage a respectable broker; he is almost certain to know who is my consignee. Note a protest.

Q. How must you satisfy yourself that the person named by the broker is your consignee ?

A. He must produce the bill of lading signed by me and which has also been endorsed by the shipper.

Q. Suppose the bills of lading be specially endorsed, thus :

"To be delivered to A on order from B."
Or : "To be delivered to A on payment for the goods."
Or in any other manner.

A. A must in the first case produce B's order before I deliver the goods to him.

In the second case, he must produce proof that he has paid for the goods.

Or, whatever may be the special endorsement, he must produce proof that it has been complied with before I deliver the cargo to him. Otherwise my owner would be liable to the shipper for wrong delivery.

Q. Two parties come to you, each with a bill of lading in proper order, to which of them would you deliver the cargo ?

A. To the first that came, provided he would give me a deed of indemnity against any other claim.

Q. What next ?

A. Give the consignee written notice when I am ready to discharge. Enter a copy of the notice in the log.

Q. Can the shipper stop delivery of the goods ?

A. Yes. If the consignee have failed; or there be good reason for doubting his credit, the shipper must give me notice that I must retain the goods. This is called *Stoppage in Transitu.*

Q. Your cargo is liable to damage, what must you do before breaking bulk; and after discharging, if any damage ?

A. Call a survey on the hatches. Call a survey on the dunnage.

Q. On arrival you cannot find your consignee ?

A. Advertise for him. In case he does not appear before the lay days are expired, warehouse the cargo, advise the shipper, consult a solicitor.

Q. When do your lay days commence ?

A. When the ship is at her discharging berth, and all ready to discharge.

DAMAGE TO CARGO.

Q. Your ship, or cargo, has received damage ?

A. Extend the protest before a notary public.

Q. The damage is a subject of general average ?

A. Get the consignee to sign an *Average Bond* before delivering the cargo to him.

Q. You have a cargo in for three different merchants, A, B, and C; in a gale of wind you are forced to throw A's goods overboard; does that come under particular or general average ?

A. Under general average.

Q. On arrival in your port, what would you do before breaking bulk ?

A. Get the receivers of B and C's goods to sign an average bond.

Q. What is an *Average Bond* ?

A. A bond binding all parties to pay their share of the loss.

Q. What is the reason that B and C must pay for A's loss?

A. Because the sacrifice of A's goods was the means of saving B and C's.

Q. What is an *Average Statement*?

A. A paper, generally drawn up by a professional man, shewing the particulars of the loss, the contributing value, and each party's share.

EXAMPLE OF AN AVERAGE STATEMENT.

The following example is from Abbott on Shipping:—

Suppose the following case. A ship was riding in the Downs and slipped from her anchor, she struck on the Goodwin, and the captain was compelled to cut away the mast and cast overboard part of the cargo. In doing these things another part was damaged, the ship got off the sand, and took refuge in Ramsgate.

Amount of Losses.	£	s.	d.
Goods of A cast overboard	500	0	0
Damage of B's goods by the jettison	200	0	0
Freight of goods cast overboard	100	0	0
Price of new cable, anchor, and mast £300			
Deduct one-third 100	200	0	0
Expenses bringing ship off the sands	50	0	0
Pilotage, port dues, going in and out of the harbour, and commission to the agent who made the disbursements	100	0	0
Expenses there	25	0	0
Adjusting the average	4	0	0
Portage	1	0	0
Total of losses	£1800	0	0

Value of Articles to Contribute.	£	s.	d.
Goods of A cast overboard	500	0	0
Sound value of the goods of B, deducting freight and charges	1000	0	0
Goods of C	500	0	0
Do. of D	2000	0	0
Do. of E	5000	0	0
Value of ship	2000	0	0
Clear freight, deduct wages, victuals, &c.	800	0	0
Total of contributory values	£11,800	0	0

£	£	£	£	
Then 11,800	1180	100	10	that is each person will lose 10 per cent.

Therefore A's loss is	50 00	D's loss is	200 00
B's	100 00	E's	500 00
C's	50 00	The owner's	280 00
	200 00		980 00
			200 00
		The sum of all the losses,	1180 00

Upon this calculation, the owners are to lose £280; but they are to receive from the contribution £380 to make good their disbursements. and £100 more for the freight of goods thrown overboard, or £480, minus £280.

They, therefore, are actually to receive	£200	0	0
A is to contribute £50, but has lost £500, therefore is to receive	450	0	0
B is to contribute £100, but has lost £200, therefore B is to receive	100	0	0
Total to be received	750	0	0

C, D, and E have lost nothing, and are to pay as above, viz.:

C	50	0	0
D	200	0	0
E	500	0	0
Total to be paid	£750	0	0

Which is exactly equal to the total to be received, and must be paid by, and to, each person, in rateable proportion, to be ascertained by another calculation, which it is unnecessary to state here.

REMARKS.—A case was tried before the Court of Queen's Bench. A vessel from New York brought flour in barrels and turpentine in barrels, as part of her cargo. On arrival at Liverpool, it was found that the flour was tainted by the fumes from the turpentine, and damaged to the amount of nearly £197.

The judge, Lord Campbell, said: "The opinion of the Court is . . . that the owners of the ship took the goods in good order and condition, and undertook to deliver them in good order and condition, the dangers of the seas excepted, they were delivered in bad order and condition, being greatly deteriorated by the turpentine. That does not come within any express or implied exception. . . The owner of the ship is liable."

In other cases, shipowners, have been held liable for damage caused to one portion of the cargo, from gas or vapour from another portion, or when one portion is of such a nature that when brought in contact with another, it will damage it. Thus: if liquids leak out of casks, and damage other goods, the owner is liable. The casks should be stowed above goods that are not liable to damage from the contents of the casks.

If damage happen to goods on the quay alongside of the ship after receipts are given for them, the owner is liable.

He is liable for goods plundered from the ship.

He is liable for improper stowage, even when the stevedore is employed by the merchant. The captain has control over the stevedore, and ought to exercise a general supervision. Some cases have been decided differently.

If deck cargo be carried without the merchant's knowledge and permission, and it be lost or damaged, the ship is liable.

If through defects in the ship, the voyage be unusually lengthened, and the cargo be damaged, or market lost in consequence, the ship is liable to pay damages.

The ship is liable for damage by rats, unless the captain can produce evidence that he took every precaution against them; such as smoking his ship, keeping cats and traps on board, and so on. Shipowners have had to pay for bright deals damaged by coal dust; for tallow damaged by sand ballast; for olive oil leaking on marble, and staining it; for packages of tea, coffee, and cheese being gnawed by rats; for cutting timber and deals; for the ship not being properly dunnaged, and the cargo being damaged in consequence, and so on.

The following are two cases of several which have come under the author's notice:—

A ship damaged grain from the Baltic; it was found that the dunnage was two inches lower than was usual in the trade, and the owner had to pay £40 damages.

Another ship damaged thin iron plates; on survey, it was found that the dunnage was above the required height at the keelson, but it was laid flat across the ship, so as to be only about 3 or 4 inches high at the bilges. A claim was made on the ship for £150 damages.

It is hoped that these instances will impress captains and mates with the importance of taking every care of the goods entrusted to them.

It is a general principle that the ship is liable for all damage that could have been prevented by human care and foresight, but she is not liable for damage caused by the act of God.

The captain is bound to prove that he has taken every precaution; and for this purpose he should superintend the mate in filling the log-book up.

FREIGHT. DEMURRAGE.

Q. What is a *Lien* on the cargo?

A. It is a right to retain the cargo until the freight be paid.

Q. Has the merchant a right to see the cargo before he pays the freight?

A. He has.

Q. If the freight be payable in cash *on delivery or during delivery*, has the owner a lien?

A. He has.

Q. If you are doubtful of the merchant, how should you act?

A. Demand the freight day by day as the cargo is discharging. Or demand a satisfactory guarantee.

REMARKS.—The master should use a little tact in a case of this kind. Treat the merchant courteously, but keep drawing on him as the cargo goes out, to send to your owner, or to pay wages and expenses.

In England, if the consignee refuse to pay the freight as the cargo leaves the ship's side, warehouse the cargo, and at the end of 90 days advertise, and sell it to pay freight and charges. If it do not bring sufficient money for these purposes, sue the charterer for the difference.

Q. If the freight be payable *after delivery*, or *by bills*, has the owner a lien?

A. He has not.

Q. Has the owner a lien for general average, demurrage, or dead freight?

A. He has for general average, but not for demurrage, nor dead freight; unless it be agreed on in the charter, and expressed in the bills of lading.

Q. By charter you are to be paid on the right and true delivery of the whole cargo. In this case you are compelled to deliver the whole of it before being paid any freight; you have reason to doubt the merchant; what should you do?

A. Compel the merchant to deposit the freight in the hands of a banker, my consul, or some respectable person.

Q. Your merchant has got possession of your cargo, but he refuses to pay your freight?

A. Enter an action against him under legal advice, previously giving him a written notice, and extending my protest.

Q. There is £200 worth of cargo damaged, the merchant wants to deduct this amount from your freight, can he do so ?

A. No; he must pay the freight in full, and afterwards claim the amount of damage from the ship, provided it has been caused by any negligence of the master or crew, or unseaworthiness of the ship.

REMARKS.—The merchant generally makes the freight note out. The following is a form of a freight note :—

Capt. W. C. Bergen, of the *Neptune*. Cr.

By freight of a cargo of coals, as per charter party, from Newcastle to Cronstadt.

keels.	chals.		£ s. d.	£ s. d.
25	3	at 7 17 6	per keel	199 16 7
Gratuity to the captain ...		...	...	1 1 0
				200 17 7
Exchange at 29⅞d, per ruble		...	...	S.R. 1613 75
Less			rub. cop.	
Bill on London, £105		...	... 843 51	
Merchant's commission, at 3 per cent.			48 16	
Discount for cash ...		...	...	
Postages and Petties		...	... 1 48	
				893 15
				S.R. 720 60

St. Peterburg, 20*th Sept.*, 1866.

PAUL BOECKEL.

Q. What is a Bill of Exchange ?

A. It is a written order, or request, addressed by one person to another, directing the latter to pay on account of the former, to some third person, or to his order, a certain sum of money at a certain date.

REMARKS.—The person giving the direction is called the *drawer* of the bill, he to whom it is addressed the *drawee*, he in whose favour it is given the *payee*, and the sender the *remitter*.

The following is a form of a bill of exchange, it being a copy of a small bill bought at a bank by the author and sent by him to his owner. In it Thompson, Bonar & Co. are the drawers, Messrs. J. Thompson, T. Bonar & Co., are the drawees, Mr. Edward Wilkie is the payee, or person who receives the money, and the author is the remitter.

St. Petersburg, 3/15 Oct., 1866.

£10 Stg.

On demand, pay this our assignment to the Order of Mr. Edward Wilkie, Ten Pounds Sterling.

Value received of Capt. Bergen, as per advice from

THOMPSON, BONAR & Co.

THOMPSON, BONAR, & Co.

To Messrs. J. Thompson, T. Bonar & Co., London.

No. 6373.

Sometimes the bill is made payable to the order of the captain. When such is the case, before he sends it away, he should endorse it to his owner, by writing his owner's name on the back of it, and signing his own name. Thus :—

Pay Edward Wilkie. Or order.

William Bergen.

Which is an indorsement *in full.*

Or thus, William Bergen.

Which is an indorsement *in blank.*

When the payee receives the bill he must present it to the drawee who writes across it the word *Accepted*, mentions the place where it is payable, the date of acceptance, and signs his name.

The bill then becomes *negotiable*, that is, it may be paid to any person who has confidence in the parties to it. Or a bank will *discount* it; that is will advance the money less a small sum for their risk and trouble.

If the merchant have to find a bill, the captain should ask a banker to discount it. If he have to pay cash, the young captain should get some experienced captain to go with him to the bank to buy a bill.

A bill is generally given two or three in a set, one of which being paid, the others become null and void; but sometimes only one is given.

The captain should register his bill letters, and send the first of the set by the post; he should always post it himself, when he can do so, and he should send the second a few days after.

Or, he may send the second to his wife, or some confidential friend to give to his owner.

He should retain the third till he ascertain whether his owner have received either the first or second.

He should take copies of all bills lest they miscarry.

Q. Here is a bill of exchange, is it a good one?

St. Petersburg, the 6/18 Sept., 1866.

£80 Sterling.

Three Months after date pay this our *Third of Exchange* (First and Second not paid,) to the order of Mr. Edward Wilkie, Eighty Pounds Sterling.

Value received from Capt. A. Wilkie, of the Seaforth, as per advice, from

THOMPSON, BONAR, & Co.

THOMPSON, BONAR, & Co.

To Messrs. Thompson, Bonar, & Co.
Third.

No. 6173. 1st for acceptance with the drawee.

A. I see it is the *third*, first, or second as the case may be; it is good provided the other two are unpaid; if either of them be paid it is null and void.

If the ship be chartered homewards, as soon as she is ready to take in cargo, written notice shall be given to the merchant through the consul, and a copy of the letter given to the mate to insert in the log-book.

At Cronstadt, when the ship is loaded, the Captain must go to the consul's office, sign bills of lading, and settle with the cashier. The consul then gives him a bill of lading, a bill of health if required, and a note to the English clerk at the custom house, who returns his ship's articles, the captain takes them to the guard ship, where he passes through a few formalities, gets a ticket for a pilot, and is then at liberty to proceed to sea.

Previous to leaving port the captain should send his owner an abstract of receipts and expenditure on ship's account. He need not be very exact; in fact it is often impossible for him to be so, as he has often to pay pilots, steamboats, and other unforseen items, when he is just on the point of departure. All that is necessary is to give his owner some idea how the money is expended. Of course, correct and particular accounts will have to be given at the end of the voyage.

The following is the form of an abstract, which may be sent on one side of the master's last letter to his owner :—

SIR,—Annexed is an abstract of receipts and disbursements on ship's account while at Cronstadt.

	ruble.	copec.	£	s.	d.	£	s.	d.
Received freight						200	17	7
Remittance to Owner.....£105			0	0				
Provisions	230	72						
Stower	123	83						
Dunnage.....	14	38						
Port Charges, Brokerage	147	08						
Consul's Charges	71	92						
Commission Outward.....	48	16						
Steamboat, pilot, small items	72	63						
Exchange at 29½d. per ruble ...	708	72	88	4	5			
Cash to Crew.....			5	0	0			
Balance in hand.....			2	18	2			
						200	17	7

Errors and omissions excepted.

BREACH OF CHARTER.

Q. The agent of the charterer wishes you to cancel the charter?

A. I would not do so without authority from my owner, and also the written consent of the charterer.

Q. What would you do?

A. Lie my lay days, and if required, the demurrage days also; then protest against the charterer, his agent, and all whom it may concern.

Q. Is the ship then at liberty to recharter to the best advantage?

A. Yes. And if any loss be caused by the non-fulfilment of the original charter, the charterer can be made to pay for such loss.

Q. If a merchant cannot load a cargo, can the ship proceed in ballast to the port she came from, and there demand the full freight.

A. No, she cannot; the master ought to do all he fairly can to diminish the loss the merchant has the misfortune to sustain.

Remarks.—In 1868 a ship was chartered to load wheat or other grain from Montreal. On arrival, the price of wheat had fallen so much in England, that the merchant's agent could not send any from Canada, except at a loss; he therefore kept the ship all her lay days and demurrage days. The agent asked the captain to cancel the charter; but not having authority to do so he declined. Two days before the demurrage days expired, a letter arrived from the merchant instructing the agent to load the ship. The agent said that he had not time to purchase the cargo, and failed to load the vessel. When the days expired, the captain protested against the merchant, his agent, and all whom it might concern, served the agent with a copy of the protest under legal advice, and then chartered the ship to the best advantage. The documents were sent to the owner, and he received £60 in part payment; the merchant saying that he would pay the balance, £160, when the ship arrived at home, and the loss was exactly ascertained,—which he did. Another ship recovered nearly £500, for loss on breach of charter, at the same time and place.

In such cases, it is the best way to consult a respectable solicitor, and be guided by his advice.

DEAD FREIGHT.

Q. What is Dead Freight?

A. If the merchant fail to load a full and complete cargo according to charter, he must pay the owner freight for the deficient cargo. The money so paid is called Dead Freight.

Q. Where must the dead freight be claimed?

A. At the port of loading, and if not paid, a protest must be made against the merchant and the amount claimed at the port of discharge.

Remarks.—As an example: A ship was chartered to load a full and complete cargo of timber at Cagliari, and to discharge at Woolwich Dockyard. There was not sufficient to load the ship. The captain asked the agent if he had any other suitable cargo to fill the vessel. The agent had no other cargo; neither had he any power to pay the dead freight. The captain protested against him and all whom it might concern, secured the cargo, and proceeded on his voyage. On arrival, before breaking bulk, he requested the consignee to appoint a surveyor to measure the empty space. This was done, and freight was paid for it.

As another instance: A ship was chartered at Lisbon to proceed to two ports on the coast of Portugal, and there load a full and complete cargo of locust beans. The ship proceeded to those ports, but the agent had not sufficient cargo to load the vessel. The captain offered to take any other suitable cargo that could be obtained, but none could be got.

The captain then sent letters and telegrams to the merchant at Lisbon, and the merchant ordered him to proceed on his homeward voyage, offering to pay a certain sum for the loss he had sustained. The captain refused to take that sum; protested against him and all whom it might concern; sent copies to him, and requested him to have some person to survey the empty space before the ship broke bulk at home. When the ship arrived at home, a survey was held, and a guarantee for the amount of dead freight, £108, given to the captain before the ship broke bulk.

We may remark on this case, that when the captain's letters and documents were laid by his owner before the demurrage association in which the ship was entered, the solicitor and other gentlemen belonging to the association were of opinion that the ship would not be able to recover the dead freight, because such dead freight was not endorsed on the bills of lading by the agent. The captain did ask the agent for the dead freight, but the agent only laughed at him, and told him he did not care for either him or the merchant, and he might get the dead freight as he could, and it was only by the influence of the British consul that the agent was induced to give the captain a letter stating that he had no more cargo for the ship. He said he had fulfilled his contract with the merchant, and had nothing to do with dead freight, and would not write a word about it.

It certainly would be a necessary and prudent precaution to have the bills of lading endorsed with the facts of such cases, for then the receiver of the cargo could not dispute them; but when, as in the preceding case, the merchant or his agent is obstinate, and refuses to allow the bill of lading to be endorsed, then all the captain can do is to take legal proceedings, under the advice of his consul, to protect his owner's interest, by signing the bills of lading *under protest*. The protest must be given to the shipper before the bills of lading are signed, and it would be advisable to send copies to the owner of the ship, and to the consignee of the cargo.

If the shipper refuse to allow the words, "*Under protest*," on the bills of lading, then the captain can draw up bills of lading of his own, sign them, and tender them to the merchant. Or, as a last resource, if he can obtain money to pay his charges, he can sail without signing the bills of lading.

A knowledge of exchange is of great importance to a captain of a ship. As an instance, the writer was told by the captain of a steamer that he drew £500 for the use of his vessel from the merchant at Galatz. He got the money in French Napoleons; these were equal to a certain number of piastres at Galatz, a different number at Ibrail, another number at Sulina, and different again at Constantinople; so that the captain had some difficulty in squaring up his accounts.

When writing important letters to your owner, do not enclose your letters in an envelope. All letters are stamped by the post office authorities, and such stamp is a proof that the letter has actually gone through the post office; but if envelopes are used, the stamp is only a proof that the envelope has gone through the post; it does not prove that any letter has gone.

Always keep your owners well advised of your proceedings,—when you expect to sail, wind, weather, state of the ship, quantity and kind of cargo, any change in the crew, or anything else it may be for his interest to know.

When the ship has been on a long voyage, it is probable that the crew will have had a considerable sum of money advanced, on account of their wages; in such a case, it is a duty incumbent on the captain to send an account of the sum each man has had. The author knows of several cases where, owing to the loss of the ship and all hands, or the death of the captain alone, the owners have had great difficulty to wind up the ship's accounts, and it has been too often the case that the captain's relatives have had to suffer a heavy pecuniary loss, besides having to mourn for the death of their protector.

RETURNED HOME.

Suppose the ship to be bound to London. On arrival at Gravesend, the ship must be hove to until the quarantine officer examines the captain's bill of health, if he has one, and puts a few questions to him; if the answers be satisfactory, a quarantine certificate is given to the captain, and he is admitted to pratique, and an officer is put on board of the ship.

The captain is then at liberty to go ashore, and to go to London, if he choose to leave the ship in charge of a pilot to dock her, and his keys with the mate.

His first visit must be to his broker, who will report and enter his ship inwards at the custom house.

Q. What documents do you require at the custom house?

A. The ship's register, charter, bills of lading, manifest of cargo, quarantine certificate, last light bill, list of stores which pay duty, spare spars, and dunnage deals.

The broker sends a clerk with him to the custom house, where the captain goes through certain formalities, and answers such questions as may be put to him.

The broker then sees his merchant, who passes an entry for the cargo, and the ship is then ready to discharge.

The broker generally advances cash to the captain, to pay wages and other items, and receives authority from him to draw his freight and send it to his owner; but, if it can be done, the captain ought to send his freight to his owner before leaving port.

The captain ought to deliver his articles, and official log, with the required entries properly made, to the shipping master, and pay his crew's wages as soon as convenient after the ship is reported.

Q. What document do you give to each of your crew twenty-four hours before paying him off?

A. An account of his wages.

Q. What document does the shipping master give you after you have paid your crew off, and paid the charges; and what will you do with it?

A. A document called "BB," which I must produce to the customs officer when the ship is discharged.

The captain and mate ought to keep a general supervision over the lumpers and weighers of the cargo, and if any dispute take place, it ought to be rectified as soon as possible.

When the cargo is out, the ensign must be hoisted at the peak for the customs officer, who will clear the ship, and will give the captain a jerking note, containing a list of all dutiable articles left on board. This note must be produced to any customs officer who may require to see it.

If possible, the captain must get the weights or measures of the cargo from the weigher or measurer, and give them to the broker, to enable him to settle freight with the merchant.

The broker ought to pay the dock dues and charges, and get a pass for the captain, who is then at liberty to ballast and sail homewards.

On arrival home, the captain ought to give the owner a balance sheet of receipts and expenditure during the voyage, specifying every item, with all the vouchers and documents.

The preceding is the routine of a particular voyage, but the main points in every voyage are the same. In general, whenever a ship arrives in any port from a foreign country, the captain is not at liberty to land until he has been examined by the authorities of the place; and after that, a respectable broker, or captain that may happen to be there, will keep him right in any formality he may have to pass through.

MISCELLANEOUS REMARKS.

In case any of the crew misconduct himself while the ship is in port, it is necessary to take him before the consul, or a magistrate; and the judge will inflict such punishment as he may deem proper. The captain is not justified in punishing a man himself while he is in a port, where magistrates will do justice to both parties.

In some ports it is necessary to give written notice to the merchant when the ship is ready to discharge; but in other ports the entry of the ship in the custom house fixes the time that the lay days commence; but in all cases it is prudent and courteous to see the merchant, or his agent, as soon as convenient.

A charterer has no power to detain a ship after she is loaded and ready for sea, even if the lay days for loading are unexpired.

If the ship be reported on a Saturday, too late for the merchant to begin discharging in fair time, the merchant would be entitled to count his lay days from the following Monday.

Lay days do not count while a ship is under repairs at a port of call.

Lay days do not count while a ship is waiting for spring tides.

If lay days be not mentioned in the charter or bill of lading, a "reasonable time" should be allowed for the discharge of the cargo. This "reasonable time" to be determined by the custom of the port, or by the decision of arbitrators.

If a ship be ordered to discharge at a wharf, or in a dock without any wharf or dock being mentioned, in a certain port, her days will count from the time she is alongside of such wharf, or in any dock in the port.

If she be ordered to a particular wharf, or a particular dock, her days count from the time she is alongside of such wharf, or in such dock.

Written notice should be given when the ship is ready to load or discharge. Those notices should be copied into the log-book, and witnessed by the person who served them, as also by the captain and mate. If the captain be owner, or part owner, then some of the crew, as the second mate or carpenter, should witness the notice.

A consignee is only bound by the terms of the bill of lading, he is not ordinarily bound to refer to the charter, without the captain takes the precaution to write in the bill of lading: "*All conditions as per charter.*"

Q. Can a master of a ship legally marry two of his passengers together?

A. No.

The master can refuse to sign bills of lading if they be not in accordance with the charter.

The master has not power to alter a charter entered into by the owner without his consent.

Charters are partly printed and partly written. If there be any discrepancy between the printed and the written matter, the terms of the written matter must be adhered to.

It is the duty of the consignee to watch for the arrival of the ship. The master is not bound to give him notice, although it will be prudent to do so.

If the master, or owner, or any of the crew agree *in writing* to submit any question between them to the decision of the Superintendent of the Shipping Office, then that decision will be binding upon both parties.

If the ship be unseaworthy at the time of insuring her, the underwriters will not be liable if she be lost.

If the ship be chartered *to be at a certain port at a stated time*, and she fail in being there, the shipper can refuse to load her. No excuse, such as delays by perils of sea, can be admitted.

If the ship be under a warranty *to sail, sail from, depart, not to sail*, &c., on, or before, or after a certain date, she must literally act according to the terms of the warranty.

Do not take sand ballast if you can avoid it.

Spread iron ballast fore and aft.

A master of a general ship can require any package to be opened that he has reason to suspect contains dangerous goods; such as gunpowder, dynamite, aquafortis, &c.; but the shipper, or his servants, must be present.

On arrival at the port of destination, if the cargo be damaged, the merchant must pay the freight and sue for damage.

If the ship deviate from the voyage specified in the articles, the crew can leave her, and can demand their wages up to the time they leave the ship.

Always write in courteous terms to your merchant. Thus:—

LONDON, *2nd April*, 1869.

MESSRS. SARAMANGA & Co.,

Gentlemen,—I beg to inform you that the *Neptune* of Blyth, under my command, with a cargo of wheat consigned to you, is now ready to discharge according to the terms of my charter party, dated January 16th, 1869. Hoping you will favour me with a good despatch,

I remain, gentlemen,
Yours very respectfully,
Wm. C. BERGEN.

The author has known a ship kept longer than she would have been, owing to the notice being too strictly legal, and not sufficiently courteous.

Some merchants are in the habit of loading and discharging ships as fast as they can, and they are rather offended if notice be given to them in a strictly legal form: they are better satisfied when the captain places confidence in them. Other merchants require every thing to be done in legal form. The captain must use a little tact, and act in the manner best adapted to further his owner's interest. Always endeavour to oblige the merchant, if you can do so consistently with your duty to your owner.

SEAMANSHIP FOR MASTER.

Q. You spring your main mast?

A. Fish it with the spare topmast, top gallant mast and other spare spars.

Q. Your ship loses her main top mast, you have plenty of sea room?

A. Get the ship on the other tack and try to save the gear: if that cannot be done, cut it adrift; if I have no suitable spare spar, make a brigantine of the ship.

Q. You have command of a passenger ship?

A. Station and exercise the crew and passengers frequently, so that every one knows his post in case of fire or serious accident. See that boats and fire engines are kept in good order.

Q. You are forced to leave the ship in boats and rafts?

A. Take bread, water and tinned meats.

Q. Your ship is on her beam ends?

A. If in anchorage: Let go the lee anchor, if it can be done; if not, let go the weather one. If not in anchorage: Pay out the lee cable chain unshackled from the anchor. Or ride by a large spar, or by a sea anchor. When the ship comes head to wind, trim the ballast or cargo.

Q. You want the ship before the wind ?

A. Heave a kedge over the lee quarter, or pay chain out, or ride by a spar, or sea anchor, out aft.

Q. You spring a great leak ?

A. Try to get at it, and stop it either outside or inside. If that cannot be done, fother it ; that is, get a sail and fasten chopped oakum, or other suitable matter, slightly to one side of it, make ropes fast to the four corners, and pass the sail under tho bottom over the leak.

Q. You have to slip in a roadstead, and you must go out on the starboard tack ?

A. Take a hawser out of the starboard quarter and make it fast to the cable chain, haul it tight, and watch the ship's head, when it cants to port, surge the chain, set the courses and staysails and slip.

Q. If forced to run on shore, at what time of tide would you do so, supposing that you could delay for a few hours ?

A. At the time of high water, or a little after it.

Q. You are in a ship riding in a small bay with both cables out to an end, she is driving and will be ashore in two hours, you cannot get under weigh, nor get a boat out, there are rocks astern and a sandy beach nearly abreast of you ; what would you do ?

A. Slip the off chain, and as soon as she canted slip the in chain up foretopmast staysail, when she paid off, drop the foresail, take the sheets well forward to lift her as much as possible, and run for the beach.

Q. You are ashore, listed in, about 40 feet from low cliffs, the ship is sure to go to pieces ; what will you do ?

A. Cut away the masts, let them fall on to the cliff, and thus get ashore.

Q. If you could do anything with the ship, how would you list her to prevent her decks being stove in ?

A. List her in.

Q. It falls fine weather, how would you get your ship off the strand ?

A. That would depend on the circumstances the ship was placed in. If convenient, I would get her to bow the sea, by taking out cargo, or ballast from aft, and putting it forward. It might then be sufficient to take an anchor away, take the cargo or ballast out, and at high water get a steamboat to assist.

Q. Her bottom is damaged ?

A. It may be necessary to caulk her ceiling, or to platform her.

Or perhaps she may be floated by fastening empty casks, or empty tanks, to her.

Q. She is sunk ?

A. Divers might make the hatches tight, then get pumps worked by steam to pump her out.

Q. She is nearly up to high water mark?

A. Launch her.

Q. How do you heave a ship down?

A. The vessel's ballast, provisions, and stores that are not wanted for heaving down, are all taken on shore, and the yards and topgallant masts are sent down. In some cases the yards are not sent down.

Suppose the vessel has to be hove down on her port side: then

The ship being moored a little distance from the quay.

Two strong ringbolts well secured and cleated, having the holes for them bored sloping upwards, are put into the ship's side, below the bends, about ten feet apart, and so placed that the middle of the space between them is abreast of the foremast. Chain lashings are passed through those ring bolts, and their ends made fast to the outer end of an outrigger lying on the rail, the inner end of which is lashed to the foremast, and the outer end projected over the side about 10 feet.

A large double block is lashed to the foremast, below the cheeks, and another to the end of the outrigger; a good small warp is rove for a fall, and a strain is put on it nearly equal to that on the starboard rigging.

A hard wood broad plank is laid on the waterways on the port side abreast of the foremast, and a shore is put on this plank, so that its lower end is just above a beam, and the upper end stands under the cheeks and is well lashed to the mast, and well secured at the heel, shores being put under the beam.

Two small shores, one at one-third the length of the main shore, the other at two-thirds are put between the masts and main shore, and a lashing put round the mast and main shore, in the way of those two small shores.

A large threefold block is lashed to the foremast in the way of the lower part of the cheeks, and a large double block lashed to a place for the purpose on the quay; a good warp is led from a crab winch on shore, through a leading block on the quay, and the first part led through the middle sheave of the upper block, and the fall completely rove.

The mainmast is secured, and purchases fixed to it in the same way; the only difference being that there are two purchases on it, leading to two crab winches on the shore. The distance between the leading blocks on the shore must be equal to that between the purchase blocks at the mast head.

The port topsides and decks are examined, lest there be any place that will make water when the ship is hove down.

Two pumps are put down the main hatchway, so their feet may rest on the port bilge.

The vessel is than ready for heaving down.

Should the vessel make much water when hove down, sawdust placed in a small basket (say, bushel basket), with a long pole attached to it, and moved about the place where the water is running in, will generally stop it.

When heaving down, keep an equal strain upon all the warps; they must not be surged; when it is necessary to fleet them, stopper them, and walk back the winches.

When easing the vessel up, it is necessary, or advisable, to walk back the purchases.

In Constradt, a large strong barge, fitted up with crab winches, is used to make the lower block fast to.

In case there be no place or vessel adapted to the purpose of fixing the lower block, then pass a chain under the bottom of some other vessel, and make the lower block fast to it. Or, as the author has seen at Windau, make fast to a raft of timber loaded with stones and iron.

In order to prevent the ship from capsizing, two warps are taken from the shore, or barge, passed under the ship's bottom, brought up on the offside, and made fast on board ship. As the vessel is hove down, those warps are gradually eased. If the ship will not rise herself, the warps may be used as purchases to raise her; or if there be much danger of the ship capsizing when she is being hove down, shears are rigged over the masts, and tackle made fast, so as to lower her down, and also to heave her up again, if necessary.

Sometimes a spar is placed upright, close to the ship's side, in midships, secured to both masts, and the heaving down purchases applied to the upper end of the spar.

A great portion of the force exerted is thus applied in a more advantageous manner, and the ship is easier hove down.

Q. A steamer's mast is generally too weak to bear the strain on it in heaving down?

A. Take up the deck, in the way of the mast, and also the mast combings, lash spars to the mast to strengthen it.

COMING INTO THE ENGLISH CHANNEL.

Q. You are homeward bound from South of the Line, what precautions would you take before entering the Channel?

A. Sight the Azores, and find the error of the chronometer. Find the deviation for the courses up Channel.

Q. You are from Quebec, New York, or other Atlantic Ports, it has been thick weather for a few days, and is still thick, so that you have only dead reckoning to depend on?

A. Try to strike soundings on the edge of the bank in the parallel of 49° 20′ N.; run on that parallel, and sound frequently. When tolerably satisfied with the position given by soundings, shape a course to the Start, under easy sail, or steam.

Q. What soundings have you north of Scilly?

A. Soft bottom, comparatively shoal water.

Q. What soundings in the fair way of the Channel?

A. Broken shells, small yellow stones with black specks, and fine sand.

Q. What soundings towards the French coast?

A. Deep water, coarse stones, red sand.

Q. How much more water have you towards the French side than the English side?

A. About 20 fathoms.

Q. What must you especially guard against in entering the Channel?

A. Being set on Scilly or to the Northward of it, by the tide setting to the North or NW., nine hours, and only three hours to the South.

Q. It is a heavy gale from the Westward, and thick weather?

A. Heave to with my head to the Southward.

Q. Is the Bishop Rock Light hidden on certain bearings?

A. Yes. Between SW byW and W by N ½ N.

Q. What is the bearing and distance from the Bishop Rock to Ushant?

A. S ½ E 100 miles.

Q. Where are the Seven Stones, Long Ships, Wolf Rock, and Runnel Stone?

A. Near the Land's End.

Q. What is the night mark for Falmouth on the west?

A. Lizard Lights in one, W by N till St. Anthony's light bears NNE, then steer to the harbour.

Q. What is the course up channel?

A. E ½ S correct magnetic.

Q. You are in iron ship, you have had no observations for the error of your compass, and are doubtful of it; it is hazy, but you make Ushant or the Lizard at night, can you find the course to steer up channel by your compass?

A. Yes. By bringing the Lights in line.

Q. You are nearly up to the start, it is still thick weather?

A. Consult my chart, heave to with head off, or on, as may be best, sound often, till the weather clears up, or I speak an outward-bound vessel or a fishing boat.

Q. How does the tide set in the channel?

A. Towards the French coast.

Q. Which side of the channel would you keep?

A. The English side; because there are fewer dangers, and better harbours than on the French side.

Q. What is the bearing and distance of the Casquets from Portland?

A. S. by W. ½ W., 47 miles.

Q. You are as high as Dungeness, it comes on thick?

A. Heave to with head off or on as may be required till I get a pilot; often take a cast of the lead.

Q. Where would you anchor in the Downs?

A. In 3 fathoms, between abreast of Walmer Castle and Deal Castle.

Q. It is blowing hard, wind S.W., snow showers?

A. Double reef the topsails and mizen, take the bearings of the light ships when I can do so. Have everything ready in case of parting, or having to slip. If I part, run through the Gull stream NE. ¼ E., run to Margate Roads.

Q. You are on the East Coast of England, or any other coast with which you are unacquainted?

A. Consult the chart very carefully, and before coming to any difficult part make notes in large handwriting, so that it can be easily read on deck with the aid of a lamp; thus it would not be necessary for me to go off the deck when I was at the difficulty.

Q. What is the leading mark through Hollesley Bay?

A. Orfordness Lights in one.

Q. How does the flood tide set in Hasborough Gat?

A. S.S.E. Southerly.

Q. What is the clearing mark for Whitby Scar Rock?

A. Whitby South Light open to the Eastward of the North Light.

Q. What light is shewn at Hartlepool Heugh Lighthouse from half flood to half ebb?

A. A red light below the white light.

Q. What light is shewn from Souter Point Lighthouse below the revolving light?

A. A white light in the line of Mill Rock and Cape Carr Point. A red light in that of Whitburn Steel, Hendon Rock, and White Stones.

Q. You are in a sailing ship at anchor in narrow waters, bad weather, strong tide, and many ships about you, how would you get under weigh?

A. I would reef the sails according to the state of the weather, then act according to circumstances.

Perhaps I would furl the sails until the chain was short.

Or, Wait until the tide turned.

Or, Hang by a warp till the anchor was at the bows.

Or, Drop or dredge, clear of ships or shoals.

Or, Run a kedge and warp away and haul the ship out.

Or, Run a kedge and warp out aft and swing the ship.

Q. You are in a screw steamer at anchor in similar circumstances?

A. I would know whether the screw was right or left handed, and in case it was necessary to come astern, I would know which way her bow would cant, and act accordingly. In case there were no room to manage the ship with the engine, I would warp or dredge the ship out.

REMARKS.—The Examiner may place a model of a ship on the table, and say to the candidate—Here is your ship, here is the land, here is a shoal, and here is a ship, the wind is in this direction and the tide is setting in this direction, get your ship under weigh, and the Candidate must give a satisfactory answer.

RUDDER LOST.

Take sail off the ship; the ship will most likely fly into the wind; keep her so by the main topsail full and foretopsail aback, and perhaps the mizen set. If the sails will not fetch the ship into the wind, ride by about 30 fathoms of cable chain payed out; or by a span fast to a large spar.

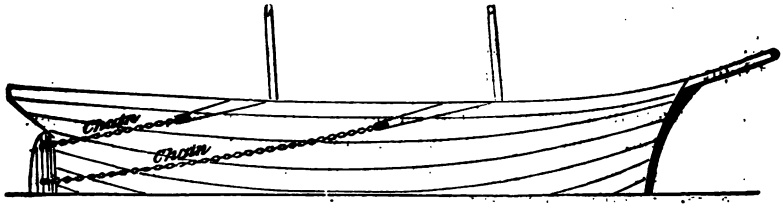
The ship being quiet: make a temporary rudder according to one of the following plans.

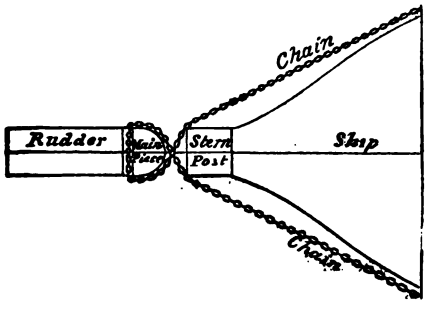
Capt. F. W. Withers, Examiner in Seamanship to the Local Marine Board, London, suggests a method which may be described as acting on the same principle as an oar at a boat's stern does. He proposes that one end of a spar should be suspended by a chain down the rudder trunk, or under the counter, and the other end should have a blade like an oar; weights attached to sink it, a tackle to trice it up when necessary, and guys to lead through blocks at the end of the spar across the stern, and thence to the barrel of the wheel.

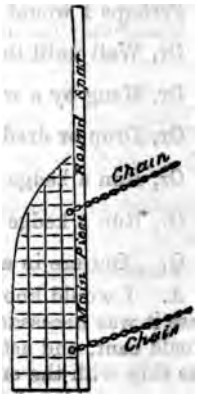
Diagrams and descriptions are given in the Nautical Magazine for November, 1873.

The following are other methods which have been used:—

TO MAKE AND FIX A TEMPORARY RUDDER.







Take a spare spar and cut it the length of the main piece of the intended rudder (which length can be found by measuring from the upper mark on the stern post to the height required above the deck); then bolt shorter pieces on to the after part of the main piece, so as to form a rudder, and to strengthen these, nail planks or bulwarks across them. Then cut two large holes abaft the main piece, one about two feet below the rudder trunk, and the other about three feet from the heel. Reeve a hawser chain through each hole; middle them, and knot them with an overhand knot before the main piece; seize the knot; worm and serve the chain with rope where it takes the stern post, so as to prevent chafe. Take two lines from each side of the ship, and make them fast to the ends of the chains; get two tackles on each side ready to haul the chains taut.—*See the adjoining diagrams.* Attach a small kedge with a slip rope to the heel of the rudder, to sink the lower end; secure the bight of a hawser to the end of the rudder, and pass one end of it under the counter and up the rudder trunk, with a snatch block made fast to the crutch.

When all is ready, the kedge and rudder could be put over the lee quarter or taffrail, the chains being hauled in by the lines on their respective sides, and the hawser hauled up the rudder trunk as the other one is slacked away, and when the rudder head is directly below the trunk, the hawser up the trunk could be snatched, and hove upon till the rudder head is high enough above the deck; after which the hawser chains should be bowsed well taut on each side, take care that the rudder is fairly abaft the stern post; the lower chains taken well forward, say to the fore chains; the upper chains further aft, say about the main chains. When all is well taut, the kedge should be slipped and hauled in, the tiller fit on the rudder head, or a hole cut, and a spar put through for a temporary tiller.

If the rudder is light, and likely to jump up with the sea, its head should be kept well up, and a broad strong plank put above it, and secured to the rail on each side, so that the head just touches, and if the rudder is heavy and is inclined to fall, a small pair of shears over the trunk with a small tackle will keep it up.

To prevent the rudder head damaging the rudder trunk, if two planks or spars be bolted or secured athwart the deck, one before and one abaft the rudder head, just so near that the rudder could move, the spars where they take the rudder to be rounded and greased; these would keep it steady from moving fore and aft, and two pieces fitted in fore and aft would keep the rudder from moving athwart.

A ship which lost her rudder in the Atlantic was brought safely to the Tyne with such a rudder as the above.

In a steamer it would be necessary to keep the lower chain clear of the propeller. Also to form a rudder trunk outside of the taffrail with planks projected over the stern, well secured, cross pieces bolted to them, and a round hole formed for the main piece.

Should the vessel be near her port at the time of losing her rudder, a spar with the lower end like the blade of an oar may be put over the taffrail, and weights as an iron anchor stock, and guys attached to it; similar to the plan proposed by Captain Withers.

A vessel may be steered into port by two smacks, or better still by steamboats, one ahead and the other astern, or by one or both alongside.

It has been recommended to tow a boat astern with her plug out.

Or, lash a stout block at each end of a spare topmast, or other suitable spar; lash the spar across the quarters a little before the wheel. Pay about 40 fathoms of cable chain over the stern; middle about 50 fathoms of lanyard rope; pass it round the barrel of the wheel, and the end through the blocks at the end of the spar, and make them fast to the cable chain; pay away chain until the lanyard rope touches the water; the apparatus is then ready for use.

DEVIATION OF THE COMPASS.

The applicant is to answer correctly at least eight of such of the following questions as are marked with a cross by the Examiner.

1.—What do you mean by deviation of the Compass ?

2.—How do you determine the deviation (*a*) when in port, and (*b*) when at sea ?

3.—Having determined the deviation with the Ship's head on the various points of the Compass, how do you know when it is Easterly, and when Westerly ?

4.—Why is it necessary, in order to ascertain the deviations, to bring the Ship's head in more than one direction ?

5.—For accuracy, what is the least number of points to which the Ship's head should be brought ?

6.—How would you find the deviation when sailing along a well-known coast ?

Questions 7, 8, 9 and 10, are solved in the examples in the use of Napier's Diagram.—*See Bergen's Navigation.*

11.—Name some suitable objects by which you could readily obtain the deviation of the Compass when sailing along the coasts of the English Channel ?

12.—Do you expect the deviation to change ; if so, state under what circumstances ?

13.—How often is it advisable to test the accuracy of your table of deviations ?

14.—State briefly what you have chiefly to guard against in selecting a position for the Compass ?

ANSWERS TO THE QUESTIONS ON THE DEVIATION OF THE COMPASS.

1.—The difference between the correct magnetic course, and the standard compass course.

2.—By swinging or placing the Ship's head to every point of the standard compass, and then (*a*) By taking reciprocal bearings; the bearings of a distant object, or of some conspicuous object in a line with figures on a dock wall (*b*) By bearings of well known conspicuous objects in a line on the coast, or by azimuths and amplitudes and the known variation at the Ship's place.

3.—If the correct magnetic bearing of an object be to the right hand of the standard compass bearing, the deviation is East, but if it be to the left it is West.

4.—Because the deviation alters as the course alters.

5.—Eight; equi-distant.

6.—By taking the standard compass bearing of two well-defined objects in a line, as for instance, two points of land, two beacons, buoys, or light ships, not too near each other, the difference between the correct magnetic bearing by chart and the compass bearing is the deviation for the Ship's course when the bearing was taken.

11.—South Foreland lighthouse in one, bearing W by N correct magnetic. Beachy Head lighthouse, just open of the cliffs to the eastward, bearing NW by W correct magnetic. Portland lights in one. Shambles and one of Portland lights in one. Prawle Point and Start lighthouse in one. Lizard lights in one. Any two well-defined fixed objects at a moderate distance from each other that can safely be brought in one.

12.—Yes; it changes rapidly for several months after the ship is launched; it changes by change of the magnetic latitude; by the ship heeling over; by an alteration in the course steered for a long time; by taking in a cargo of iron; and by sudden blows from collision, stranding, very heavy seas, &c.

13.—Frequently in a new ship. When nearing land; and under the circumstances stated in Art 12.

14.—Elongated iron, especially if it be vertical; as stern posts, masts, funnels, davits, spindles, ventilators, &c.

15.—The compasses of Iron Ships are more or less affected by what is termed the heeling error; on what course does this error vanish, and on what course is it the greatest?

16.—State to which side of the ship, in the majority of cases, is the North point of the Compass drawn in the Northern hemisphere; and what effect has it on the assumed position of the Ship when she is steering on Northerly, and also on Southerly courses?

17.—The effect being as you state, on what course would you keep away, and on what course would you keep closer to the wind, in order to make good a given Compass course?

18.—Does the same rule hold good in both hemispheres with regard to the heeling error?

19.—Your steering compass having a large error, how would you proceed to correct that compass by compensating magnets and soft iron, in order to reduce the error within manageable limits?

15.—It vanishes at near East and West courses, and it is greatest at near North and South courses.

16.—The North point is generally drawn to the weather side. The effect is to throw the ship to windward on Northerly courses, and to leeward on Southerly courses.

17.—Keep away on Northerly courses, and keep closer on Southerly courses.

18.—No. In the Southern hemisphere the rule is frequently reversed, but in order to determine it, observations must be made in every ship.

19.—Draw two chalk lines on the deck, at right angles to each other, one fore and aft, the other athwartships, and with their point of intersection under the centre of the compass needle.

BRING THE SHIP'S HEAD EITHER NORTH, OR SOUTH, CORRECT MAGNETIC.

Place a magnet, or, if necessary, two, on the deck, athwartships, either before or abaft the binnacle, with its centre on the fore and aft line.

If the North end of the needle deviate towards the Starboard side, place the North end of the magnet towards the Starboard side.

But if it deviate towards the port side, place the North end towards the Port side.

Then move the magnet gradually towards the binnacle, or from it, till the needle points correctly.

Next, BRING THE SHIP'S HEAD EAST OR WEST, CORRECT MAGNETIC.

Place another magnet on the deck, fore and aft, at either side of the binnacle, with its centre on the athwartship line.

If the North end of the Needle deviate towards the Bow, place the North end of the magnet towards the Bow.

But if it deviate towards the Stern, place the North end towards the Stern.

Then move the magnet towards the binnacle, or from it, till the needle points correctly.

The preceding processes correct the *Semi-circular Deviation*.

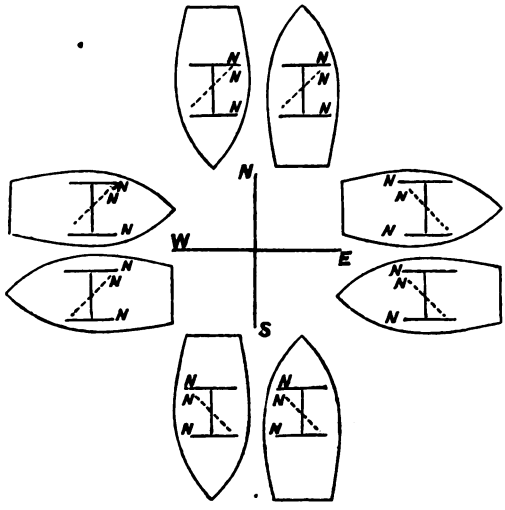
To correct the *Quadrantal Deviation*, proceed as follows:

The Binnacle being fitted with cast iron correctors, or with small brass boxes, one on each side, port and starboard, of the needle, and at the same height as it.

Then *bring the Ship's Head on one of the Quadrantal points*, N.E, S.E., S.W., or N.W., *correct magnetic*.

Then move the correctors towards the needle, or from it, or put small chain in the boxes, till the needle points correctly.

DIAGRAM SHEWING THE EFFECT OF THE MAGNETS.



In the above diagram, let the two lines at right angles to each other represent the cardinal points of the correct magnetic compass, and let the other parts of the diagram represent the deck plans of ships with their heads correct magnetic, North, South, East, and West.

One of the ships, at the part of the diagram next the top of the page, has her head North, the other has her head South.

In each of the two ships, let the fore and aft line represent the correct magnetic meridian.

In the ship with her head North, let the dotted line represent the compass needle with its North end, marked N, drawn to the starboard side by the iron in the ship.

Let the athwartship lines represent the correcting magnets, one before the binnacle and the other abaft it.

Then because *similar poles repel, but oppposite poles attract each other*, (Bergen's Navigation, Syllabus), we have the following rule.

Place the magnet before the binnacle, with its North end, marked N, to the Starboard side, and it will repel the North end of the needle, but the South end of the magnet will attract the North end of the needle, and if the magnet be brought sufficiently near, these repulsions and attractions will force the needle into the correct meridian.

The magnet abaft the binnacle will have the same effect.

By examining the other ships with their heads either North or South, it will be seen that,

If the North end of the needle deviate towards the Starboard side, the North end of the magnet must be placed towards the Starboard side.

But, *If it deviate towards the Port side*, the North end of the magnet must be be placed towards the Port Side.

When the ship's head is East or West, the compass needle is athwartship, and the correcting magnet must be placed fore and aft; and by the figures, it is evident, that

If the North end of the needle deviate towards the Bow, the North end of the magnet must be placed towards the Bow.

But, *If it deviate towards the Stern*, the North end of the magnet must be placed towards the Stern.

The preceding rules may be expressed as follows:—

Whether the ship's head be North, South, East, or West, correct magnetic.

Place the magnets in the direction of East and West, correct magnetic; and so that similar poles may repel and opposite poles attract the compass needle into the direction of the correct meridian.

EXTRACTS FROM THE MERCHANT SHIPPING ACT, 1876.

UNSEAWORTHY SHIPS.

4. "Every person who sends . . . . a British ship to sea unseaworthy . . . . shall be guilty of a misdemeanour."

"Every master of a British ship who knowingly takes the same to sea . . . . unseaworthy . . . . shall be guilty of a misdemeanour."

6. "Where a British ship, being in any port in the United Kingdom, is, by reason of . . . . defective condition, ... or by reason of over-loading or improper loading, unfit to proceed to sea . . . . such ship may be provisionally detained."

PASSENGER STEAMERS AND EMIGRANT SHIPS.

21. "Every sea going passenger steamer and every emigrant ship shall be provided to the satisfaction of the Board of Trade:—

(1) With means for making . . . . signals of distress at night . . . . such . . . . as the Board of Trade may . . . . approve; and,

(2) With a proper supply of lights unextinguishable in water and fitted for the attachment to life buoys.

. . . . The owner shall, if . . . . in fault incur a penalty, not exceeding one hundred pounds, and the master shall . . . . in fault incur a penalty, not exceeding fifty pounds.

GRAIN CARGOES.

22. "No cargo of which more than one-third consists of any kind of grain, corn, rice, paddy, pulse, seeds, nuts, or nut kernels, ... shall be carried on board any British ship, unless such . . . . cargo be contained in bags, sacks, or barrels, or secured from shifting by boards, bulkheads, or otherwise."

The owner or master who acts contrary to the above clause incurs a penalty, not exceeding Three hundred pounds.

DECK CARGOES.

25. "If a ship . . . . arrives between the last day of October and the sixteenth day of April . . . . in the United Kingdom, ... carrying as deck cargo:

(*a*) Any . . . . timber . . . .

(*b*) Any more than five spars . . . .

(*c*) Any . . . . light wood goods to a height exceeding three feet . . . . the master . . . . shall be liable to a penalty, not exceeding five pounds, for every hundred cubic feet of wood goods carried in contravention of this section."

DECK AND LOAD LINES.

25. "Every British ship, ... shall be . . . marked with lines of not less than twelve inches in length and one inch in breadth, painted longitudinally on each side amidships. . . . . The upper edge of each of these lines shall be level with the upper side of the deck plank, next the waterway, at the place of marking. The lines shall be white or yellow on a dark ground, or black on a light ground."

26 (1.) "The owner of every British ship . . . shall . . . mark upon each of her sides amidships . . . . in white, or yellow, on a dark ground, or in black on a light ground, a circular disc, twelve inches in diameter, with a horizontal line, eighteen inches in length, drawn through its centre.

(2) The centre of this disc shall indicate the maximum load line in salt water, to which the owner intends to load the ship for that voyage.

(3.) He shall also, upon so entering her, insert in the form of entry delivered to the collector, or other principal officer of customs, a statement in writing of the distance in feet and inches between the centre of this disc and the upper edge of each of the lines, indicating the position of the ship's decks which is above that centre.

(4.) If default is made in delivering this statement in the case of any ship, any officer of customs may refuse to enter the ship outwards.

(5.) The master of the ship shall enter a copy of this statement in the agreement with the crew before it is signed by any of the crew, and no superintendent of any mercantile marine office shall proceed with the engagement of the crew until this entry is made.

(6.) The master of the ship shall also enter a copy of this statement in the official log-book.

(7.) When a ship has been marked as by this section required, she shall be kept so marked until her next return to a port of discharge in the United Kingdom.

27. With respect to the marking of a load-line on British ships employed in the coasting trade, the owner shall also once in every twelve months, immediately before the ship proceeds to sea, send or deliver to the collector, or other principal officer, of customs of the port of registry of the ship, a statement in writing of the distance in feet and inches between the centre of the disc and the upper edge of each of the lines indicating the position of the ship's decks which is above that centre.

28. Any owner or master of a British ship who neglects to cause his ship to be marked as by this Act required, or to keep her so marked, or who allows the ship to be so loaded as to submerge in salt water the centre of the disc, and any person who conceals, removes, alters, defaces, or obliterates the said marks, shall, for each offence, incur a penalty not exceeding one hundred pounds.

If any of the marks required by this Act is in any respects inaccurate, the owner of the ship shall incur a penalty not exceeding one hundred pounds.

TO DRAW PLANS OF MASTS, RIGGING AND SAILS.

PLAN OF THE SPARS.

The annexed small plan is that of the Masts, &c., of the ship *Negotiator*, of 1017 tons register, on a scale of one thirty-second part of an inch to the foot.

Suppose it to be required to draw a plan on a scale of, say, one-eighth of an inch to the foot, proceed thus :—

Place a scale, taken from a carpenter's rule, at the bottom of the paper, draw a base line NO, and a line PQ perpendicular to NO.

Place the foremast in the plan as follows :

Take the distance from the base line NO to the head of the fore-mast, with a pair of dividers, and apply it to the scale, when it will be found to be 65 feet.

Take 65 feet from the enlarged scale, and apply it upwards from NO, and make a pencil mark at the height thus found. Draw a faint pencil line through this mark, parallel to NO.

Take the distance of the after side of the head of the foremast from the line PQ, when it will be found to be 26 feet.

Take 26 feet from the enlarged scale, and apply it from the line PQ along the pencil line at the foremast head, and make a mark at the point to which the distance extends ; this mark will represent the after-side of the head of the foremast.

Proceed, in like manner, to find a mark representing the after-side of the foremast, at the height of the rail.

Join these two marks by a straight line ; this line will represent the after-side of the foremast.

Set off the thickness of the foremast at both the head and rail, and draw a line to represent the fore side of the foremast : thus the foremast will be represented.

Proceed, in like manner, with the fore topmast, fore topgallant mast, and fore royal mast.

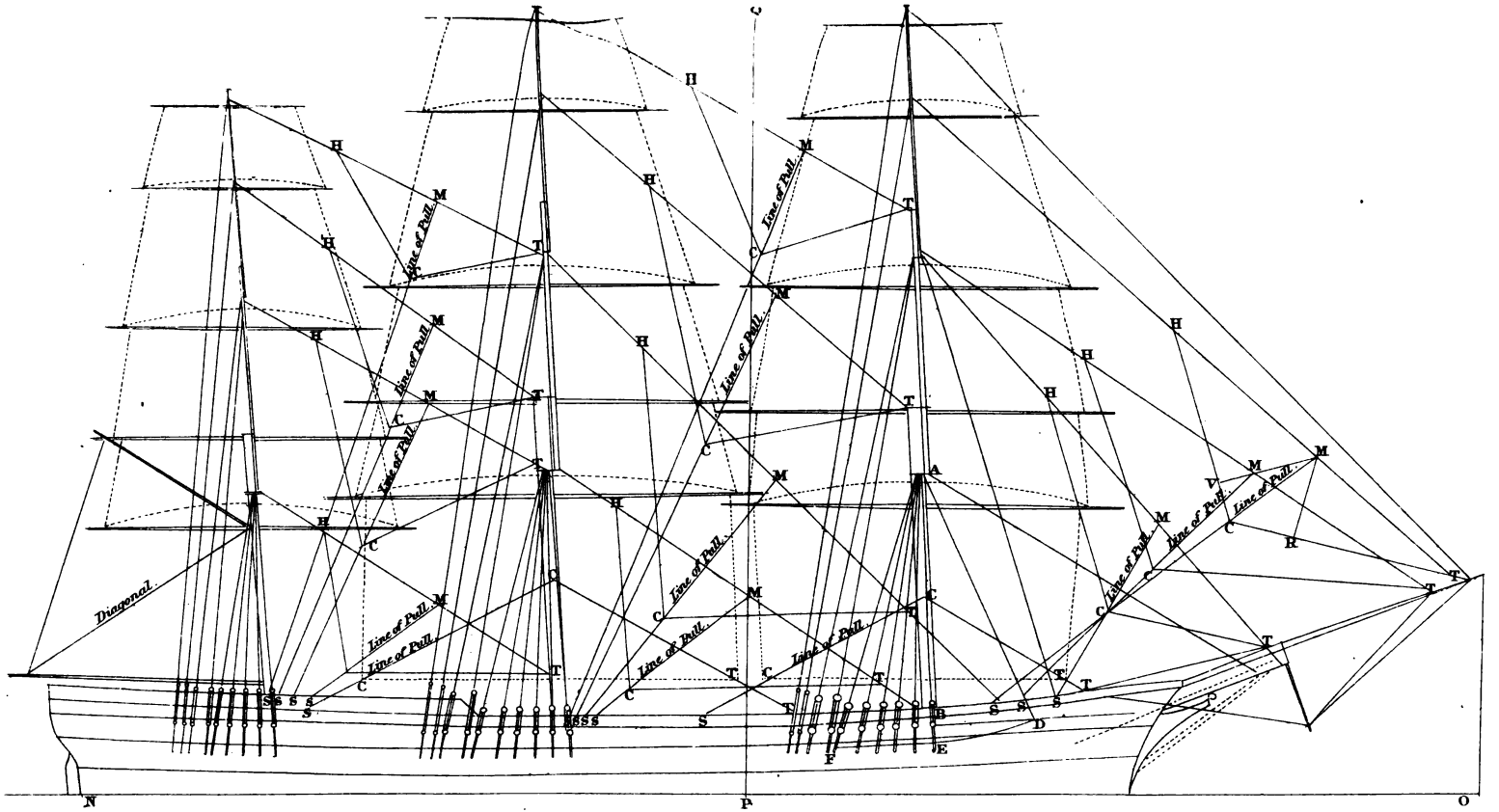
In like manner draw the mainmast, main topmast, main topgallant mast, and main royal mast.

Also draw the mizenmast, mizen topmast, mizen topgallant mast, and mizen royal mast.

Find the distance of the outer end of the flying jib-boom from the lines NO and PQ, and make a mark at the end. Make a mark also at the under side of the standing jib-boom in the way of the knightheads, and draw in the lower side of the jib-boom, then draw in the upper.

In like manner, draw in the bowsprit, martingale, yards, main boom, and gaff, and thus the plan of the spars will be finished.

PLAN OF THE MASTS, RIGGING AND SAILS, OF THE "NEGOTIATOR" 1077 TONS BURTHEN.

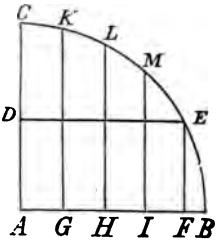


As this portion of the work is not intended for the use of naval constructors, but only for that of captains, mates, and carpenters of ships, and as there are great differences in the spars of ships, perhaps the best rule that can be given to find the length and sizes of spars, in proportion to the size of the vessel, is to take the best sparred ship of the same kind as the one that requires spars, for a pattern. It is a prudent precaution to have a plan of the masts, rigging and sails ready, in case of an accident.

The rule used by mast-makers, for finding the size and shape of yards, is as follows:—

For lower yards, allow 1 inch for every 8½ feet in length of the yard, for the size of the slings; for topsail and topgallant yards, allow 1 inch for every four feet; take half the size at the slings for the size at the yard arms.

Suppose a yard to be 10 inches at the slings, take a pair of compasses, and open them to half the size at the slings, that is to 5 inches, and with them describe a quadrant of a circle, as in the adjoining figure ABC, open the compass to the half of 5 inches, that is 2½ inches, set off AD, FE, each equal to 2½ inches, draw DE parallel to AB, draw EF parallel to AC, divide AF and DE each into four equal parts AG, GH, &c., draw GK, HL, &c., parallel to AC.



Divide each half of the yard into four equal parts, strike a middle line, take the lengths GH, HL, &c., with a pair of compasses, at every point of division, set off these lengths from the middle line at each side of it; and thus the size of the yard at every point of division is obtained.

PLAN OF THE RIGGING.

Draw in the stays, shrouds and backstays, according to the small plan.

To find the length of the fore shrouds.

The letter A is at the height of the trestletrees. Let B be 8½ feet below the foremast upper dead-eye, so as to allow sufficient length of rope for turning in the dead-eye. Draw BD perpendicular to the fore-side of the foremast, and make the line BD equal in length to the distance from the starboard side of the foremast to the starboard side of the ship, that is, in this case, 16 feet.

From the centre A, with the distance AD, describe the arc DE; from E draw the straight line EF parallel to the rail.

Take the length AE, 45 feet, from the top of the trestletrees to the line EF, to this add the thickness of the trestletrees and 1½ times the diameter of the mast above the trestletree: thus we have—

		feet	in.
Length of AE		45	0
Thickness of trestletree	0ft. 8in.		
Diameter of mast	2 2		
½ diameter of mast	1 1		
		3	11
Total length of starboard first shroud		48	11
Total length of starboard second shroud	add 2 inches	49	1
Total length of first pair of starboard shrouds		98	0
Suppose the diameter of the rope be 3 inches	add	0	6
Total length of first pair of port shrouds		98	6

Take the length of the third shroud on the starboard side, from 6 inches above the trestletrees, so that it may lie above the two pair of shrouds whose length have been taken, as follows:—

			feet	in.
Length to EF			46	0
Add			3	11
Starboard side,	Third shroud		49	11
	Add		0	6
	Fourth shroud		50	5
	Second pair of shrouds		100	4
Port Side,	Add		0	6
	Second pair of shrouds		100	10

Take the length of the fifth shroud on the starboard side, from 12 inches above the trestletrees, and proceed thus:—

			feet	in.
Length to EF			48	9
Add			3	11
Starboard Side,	Fifth shroud		52	8
	Add		0	6
	Sixth shroud		65	4
	Third pair of shrouds		106	0
	Add		0	6
Port Side,	Third pair of shrouds		106	6

Proceed, in like manner, with the main lower rigging, and mizen lower rigging.

To find the length of the fore topmast backstays.

Mark a point 3½ feet below the foremost backstay upper dead-eye.

From this point draw a perpendicular to the backstay.

Make the length of this perpendicular equal to half the breadth of the ship.

Take the length from the fore topmast crosstrees to the end of the perpendicular, which will be the length of the foremost backstay from end to crosstrees.

Mark this length on the after backstay, and to it add the extra length to a line parallel to EF, the sum of these lengths will be the length of the after backstay from end to crosstrees.

Add one-and-a-half times the diameter of the topmast head to each backstay; the sums will be the lengths of the starboard backstays. These lengths added together give the length of the starboard pair of backstays.

To this add twice the diameter of the rope, and the sum will be the length of the port pair of backstays.

To find the length of the fore topgallant backstays.

Take the length from the head of the topgallant mast, to a point below the dead-eye, so as to allow sufficient rope for turning in the dead-eye, or for splicing it in, as the case may be, and from this point draw a perpendicular to the backstay, set the half-breadth of the ship on this perpendicular, and take the length in a similar manner as was done with the fore topmast backstays.

The topgallant backstays being single, they go round the mast, either with an eye-splice, an eye formed with the bight of the rope, or with a horse-shoe.

Whichever way they go round, allow the proper length of rope for going round the mast, in addition to the length from the mast head to dead-eye.

To find the length of the fore royal backstays.

Proceed in a similar manner, as was done with the fore topgallant backstays.

The length of the fore topmast rigging, and fore topgallant rigging, is found in a similar manner.

In like manner, the length of the rigging on the main mast, and mizen mast, is found.

The length of the stays is found directly from the plan, proper allowance being made for collars, splices, turning in dead-eyes or thimbles, as the case may be.

The length of lifts, footropes, ties, haulyards, braces, and so on, also of the running ropes attached to the sails, are found from the plan, proper allowance must be made for splices.

To draw plans of sails.

It is often found that jibs and staysails are not properly cut, the after leech being too slack, and the sail girted tight across near the foot. If they be cut as follows, this evil will be avoided. In the plan of the *Negotiator*:—

Let T be the tack of the flying jib, H the head, M the middle of the fore leech, S the place where the sheet is belayed, let a straight line be drawn from M to S. If the clue be placed at C, anywhere on the line MS, then draw the after leech CH and the foot CT, the sail HCT will be of the proper shape.

The *line of pull* SCM passes through the centre of gravity of the sail, and divides the sail into two equal parts, CMH, CMT, so that the pressure of the wind on either part is exactly balanced by the pressure on the other part.

If the fore leech have from 12 to 15 inches round, the sail will stand better; it will also be better to have about from 8 to 12 inches round on both after leech and foot; this will allow the wind to glide off the sail.

Advantages of such a form of jib.

The strain is equally distributed all over the canvas, and therefore the sail lasts much longer.

The sail stands flatter, and all parts of it pull, and therefore it is of more use to the vessel.

It is not necessary to haul the jib sheet so flat aft, and therefore there is less strain on the jib-boom.

The jib, fore topmast staysail, and all the staysails between the masts, are drawn on the same plan; that is,

The clue is placed on the line drawn from the middle of the stay leech to the sheet belaying pin, and thus the line of pull passes through the centre of gravity of the sail. It can be seen that there is a great difference in the shape of those sails, and yet they will be all properly cut.

A modification of the same principle applies to the clues of tack and sheet courses; thus,

If a straight line be drawn from the centre of the middle cloth to the chesstree, and the clue be placed on that line. Then the *line of pull* will pass near, or through, C at the mast, the centre of gravity of the sail, and the lee leech will stand properly, and the sail will be of more use to the vessel.

There is one thing which further experience must determine, and that is, the proper round to allow on the leeches of the sail, so that it may not be girted, and the wind may easily glide off the after part and foot of it.

So far as the writer's experience goes, 15 inches round on a stay leech 50 feet long will be sufficient. The curve should not be regular, but should be rather outside of the regular form at the middle of the leech.

A foreman sailmaker in Blyth, whom the writer taught to draft sails, has given great satisfaction by cutting them in the preceding manner; he told the writer that according to his experience a narrow jib, from stay leech to clue, required more round than a broad one.

To find the gores.

The gores will depend on the way the sail is cut. If it be cut diagonally: Then to find the gore at the line of pull in the lower half of the jib. From M, draw MR perpendicular to CT; then, by the scale, MR is equal to 14 feet, and CR is equal to 70 feet; then say

As the length of MR
Is to the length of CR,
So is the breadth of a cloth
To the gore on that cloth.

	feet		feet		feet		ft.	in.
Or thus:	14	:	10	: :	2	:	1	5

2
——ft.
14)20(1
14
—
6
12
——in.
14)72(5
70
—
2
——

In like manner, the gore at the line of pull in the upper half of the jib is found to be 9¼ inches.

The stay leech not being a straight line, the stay gore therefore differs for every cloth, and every one must be found separately.

If the sail be drawn on a scale of half an inch to the foot, every cloth may be drawn, and the gore may be conveniently found from the enlarged plan.

If the sail be cut so that the cloths be all parallel to the after leech, the stay and foot gore may be found for every cloth from the enlarged plan.

To draw a plan of a mizen.

Measure on the plan 26 feet, the length of the fore leech, from the throat to the mizen boom at the mast.

Next measure 40 feet, the length of the foot, along the mizen boom, from the mast to the sheet cringle; the foot will probably stretch from 2½ to 3 feet. Then measure 42 feet, the length of the after leech.

Also measure 29 feet, the length of the head, along the gaff, from the mast to the head cringle.

Finally measure 45 feet, the length of the diagonal, from the throat to the sheet cringle.

A half-inch scale being convenient, proceed to draw a plan on that scale, as follows:

Draw a straight line 40 half-inches, that is 20 inches long, for the length of the foot of the sail.

Take the length of the fore leech, that is 26 half inches, or 13 inches, with a pair of dividers, place one foot of the dividers at the inner end of the line representing the foot of the sail, and describe an arc with the other foot of the dividers.

Next, take the length of the diagonal, that is 42 half-inches, or 21 inches, with the dividers, place one foot of the dividers at the outer end of the line representing the foot of the sail, and describe an arc with the other foot of the dividers intersecting the former arc.

From the point of intersection, draw straight lines to the ends of the line representing the foot of the sail, and thus the lower portion of the sail will be drawn.

Proceed, in like manner, with the upper portion of the sail, by taking the length of the gaff in the dividers, and placing one foot at the throat end of the diagonal, describe an arc with the other foot.

Do in like manner with the length of the after leech, from the other end of the diagonal.

From the point of intersection, draw straight lines to the throat and sheet cringle, and thus the upper portion of the sail will be drawn, and hence the whole of the sail will be drawn.

It is a common practice with sailmakers to keep the seams of a mizen broader at the head and foot of the sail, but it is better to keep them of one breadth the whole way down the sail.

The foot can be cut according to taste, say 3 or 4 feet up from the inner end of the mizen boom, and a good round formed.

To draw a plan of a jib or staysail without drawing any of the spars.

As the fore topmast staysail is the least encumbered with lines, it will be best to draw it in thus:

Take the length of the fore topmast stay 89 feet, also the length from the fore topmast crosstrees to S, the place where the sheet is belayed, 79 feet, and the length from S to T, the tack, 87 feet.

Form a triangle with these three lengths, as in drawing either part of the mizen, set off TH, the length of the stay leech, 57 feet, and TM, the half-length, 28 feet 6 inches, join SM, place C the clue, and draw the sail in as before.

The square sails may all be drawn on a scale of half an inch to the foot, and the gores and lengths of the cloths taken from the plans.

To find the correct shape of a jib or staysail without drawing a plan.

If a person be unaccustomed to drawing plans, and he wish to find the correct shape of a triangular sail, or in fact any sail, he may knot pieces of marline together, and place them where the sail has to be, so as to form the exact shape he requires, then stretch the marline on the ground, so as to form the shape of the sail, and cut the canvas accordingly.

TO MEASURE FOR SAILS.

It often happens when ships are away from their own port, sailors have to measure for sails, and send the measures to a sailmaker at home. When they do so, they should be particular in stating how they take them, as mistakes are often made.

To measure fore-and-aft sails.

In measuring for jibs, or other triangular sails, take the lengths of the stay leech, after leech, and foot—these three dimensions are quite sufficient. Sailors often give the number of cloths, but this is not a sufficient guide in cutting sails according to the plans in this book; they may, if they choose, give the breadth from clue to stay leech. In measuring for a trysail, or mizen, the boom and gaff ought to be placed in their proper positions, and the full measures taken; the sailmaker will make such allowance as experience has taught him is necessary for the sail stretching: thus, such a sail stretches a great deal more at the sheet cringle than anywhere else, therefore it ought to be kept short along the foot, from two to four feet according to the size of the sail; it would perhaps be advisable to keep it from six inches to a foot short at the tack also; a round should be formed on the after leech, by laying half the breadth of the after cloth in for tabling, at the head and foot of the sail, and the ordinary breadth of tabling half-way between head and foot.

The author once saw a letter to a sailmaker, with dimensions for a trysail, which did not give the length of the diagonal; the sailmaker had therefore to *guess* at the proper shape of the sail; he guessed wrong, so that the sail did not give satisfaction.

To measure for square sails.

Square sails, when properly made, will stretch along the head about 6 inches in 20 feet, and along the leech about 12 inches in 20 feet; but this will depend very much on the quality of the rope, as some kinds stretch much more than others.

To measure for a royal.

Head: Measure along the royal yard from lift to lift. *Foot:* Measure along the topgallant yard from pin to pin of sheaves in the yard. *Leech;* Measure from pin of sheave in the masts, to the hounds of the topgallant mast. The sailmaker will allow sufficient roach to clear the stay, and also allow the head, leech, and foot sufficiently short for the earrings and clues to be in their proper positions when the sail is set; he will also allow for tablings.

To measure for a topgallant sail.

Head: Measure along the topgallant yard from lift to lift. *Foot:* Measure along the upper topsail yard from pin to pin of sheaves. *Leech:* Measure from pin of the sheave in the mast to the heel of the mast. Also measure from heel of topgallant mast to upper side of upper topsail yard when the topsail is hoisted up. The sailmaker will allow sufficient roach to clear the stay when there is a reef in the topsail.

To measure for an upper topsail.

Head: Measure along the upper topsail yard from lift to lift. *Foot:* Measure along the lower topsail yard from hounds to hounds; there is no roach in this sail. *Leech:* Measure from pin of sheave in the mast to the upper side of the lower topsail yard. The sailmaker will probably keep the sail from 2 to 4 feet short, according to the size of the ship, so that the sail can be hoisted tight up after it stretches.

To measure for a lower topsail.

Head: Measure along the lower topsail yard from hounds to hounds. *Foot:* Measure along the main yard from pin to pin of the sheaves. *Leech:* Measure from the jackstay on the lower topsail yard to the upper side of main yard, also from main yard to the height of the mainstay. The sailmaker will allow for roach.

To measure for a mainsail or foresail.

Head: Measure along the main yard from lift to lift. *Foot:* Allow for the truss carrying the yard towards the side of the ship when the yard is braced up, and measure from the length of the truss before the mast to the chesstree, inform the sailmaker of the position of the chesstree, and whether it is outside or inside of the rail. *Leech:* Measure from the jackstay on the main yard to the deck. The sailmaker will allow the leech sufficiently short, so that the officers aft can see objects ahead of the ship and underneath the sail.

Shipwrights ought to be particular in placing the chesstrees for both tacks and sheets properly, otherwise it is not possible for the sailmaker to make the sail to stand; the chesstree for the sheet is generally too far aft. Draw a line from the chesstree to the middle of the sail, and place the clue on that line.

MAKING AND REPAIRING SAILS.

The following rules on this subject have been revised by a foreman sailmaker. A few of them are similar to some given by Captain Kelly in his work. "The Mate and his Duties;" they may be useful to young men.

Use a palm that fits the hand; after the needle has entered the canvas, put the four fingers of the right hand over the seam,—thus, all the strength of the hand is conveniently exerted in shoving the needle through the canvas; many sailors put only one or two fingers over the seam. When sewing new canvas, keep the stitches five to the inch. Do not take too much hold of the canvas, nor sew too tight.

Seams are generally sewn from the foot towards the head, and in fore-and-aft sails the round seam is on the fore cloth. Sailmakers often sew two round seams; sailors often sew a round and a flat seam; but foreigners generally sew two flat seams, which the writer is inclined to think is the best way when it is properly done.

In sewing new and old canvas together, the new is creased, and as it will give most, the old is kept easy, and also next the person sewing.

When the stitches of a seam is chafed or broken, do not rip them out; run a straight seam along. It is better to run two side stitches along the seams of half-worn sails than to middle stitch or snake them.

Strain bands should be put on the afterside of square sails, and on the port side of fore and aft sails.

Bolt rope must be sewn on the after side of square sails, and on the port side of fore-and-aft sails; take more slack in when sewing it on square sails than when sewing it on fore-and-aft sails, and if not well accustomed to the work, run a piece of chalk along the rope; this will prevent the canvas being sewn round it.

Sew grummets for eyelet holes on the same side as the rope; sew reef points to the upper part of the grummet in square sails, but to the lower part in fore-and-aft sails; sew the lining and buntline cloths on slack.

In putting a three-strand cringle in, say to 8-inch rope, cut the strands for the cringle from 8½-inch rope, and keep it about 4 feet long; enter the end of the strand into the upper hole first, *outwards*, or *from* the person; keep the outer end about 9 inches longer than the inner end; take 1½ turns in the strand; then put the longest end *outwards*, through the lower hole; bring it up under its own part; then follow up the lay; put the end of the strand at the upper side of the cringle down through two parts of the bolt rope, and the end at the lower part through one part of the bolt rope, and make each end follow its own part three times through; the turn of the rope should be eased on each side of the eyelet holes before the rope is sewn to the canvas, and when sewing, six cross stitches should be taken on each side of the holes.

To form a four-strand cringle, cut the strand from the same size of rope as the bolt rope; keep it about 4½ feet long; proceed as in forming a three-strand cringle, but instead of putting the ends through the bolt rope, the lower end must be passed through the hole *from* the person, the upper end *towards* the person; each end must be passed under two parts of the strand, and finished off in the centre of the cringle. Sail-makers consider that a four-strand cringle looks best; but a three-strand keeps the bolt rope more firm, and causes less chafe.

In putting the thimble into the cringle, a large smooth, hard wood fid, and not too strunt, should be used to stretch the cringle to the full size, so that the thimble may go in easy.

In making the clues of square sails, the corners should be made to suit spectacle clues, which keep the clues much easier, and are stronger than cringles.

REEVING RUNNING GEAR.

The gear may be cut from the plan, but it is safest to "reeve and cut." Pass the end down through the coil before hauling it off. Brace all the yards about, and all spars and sails in such positions that they will take the greatest length of running gear; for instance in reeving the jib haulyards, the sail should be hauled down, but in reeving the jib down haul, the sail should be hoisted up.

LOOSING SAILS AND SETTING THEM.

ROYALS AND TOPGALLANT SAILS.

Loose the lee yard arm first, then the weather one, make the ends of the gaskets fast to the tye, then loose the bunt gasket, overhaul the clue lines, leech lines, and bunt lines, haul home the weather sheet, then the lee one, and hoist away.

TOPSAILS.

Loose the sail and leave one hand in the top to overhaul the buntlines, cluelines, and reef tackles, let go the topgallant sheets and topsail braces, hoist a little on the halyards, belay them, haul in the weather brace, sheet home the sail, hoist away and slack the weather brace as the sail goes up.

COURSES.

Loose the sail and overhaul the buntlines and leechlines, overhaul the clue garnets and haul down the tacks and sheets. If the ship be close hauled, ease off the lee brace, slack the weather lift and clue garnet, and get the tack well down, haul the sheet aft, brace the yard sharp up and haul out the bowline.

JIB AND STAYSAIL.

Lie out on the weather side of the jib-boom and loose the sail, haul tight the sheet, hoist the sail, ease the sheet as the sail goes up, haul it aft when the sail is up.

MIZEN.

Haul tight the weather topping lift, and overhaul the lee one, let go the foot and head brails, haul tight the sheet, let go the throat brails and haul aft the out haul; steady the gaff and boom in their proper positions by the vang and sheet.

BLOCKS AND PURCHASES.

A BULL'S EYE is a piece of wood with a hole through its centre, for a rope to reeve in, and a groove round it.

A DEAD EYE is a piece of wood of a circular form, with three holes in it for lanyards to reeve through, and a groove round it to receive a shroud.

A BLOCK is generally made of wood and it has one, two, or three SHEAVES. An iron PIN passes through the centre of the block, and the sheaves revolve on the pin. The block is called SINGLE, DOUBLE, or TREBLE, according to the number of sheaves in it. A SISTER BLOCK has two sheaves in it one above the other. A SNATCH BLOCK is a single block, generally iron bound, with a notch in one side to receive the bight of a rope. A TAIL BLOCK is a single block, the strop is generally selvageed, or the strands are opened out and laid up into sennit.

A TACKLE is a purchase formed by reeving a rope through two or more blocks, for the purpose of hoisting or moving weights.

That part of a rope in all tackles, between the end that is fast and a sheave is called the *standing part*, the parts between sheaves are called the *running parts*, and the part on which the men haul is called the *fall.*

A WHIP is the smallest purchase, and it is made by a rope rove through one single block.

A WHIP UPON WHIP is made by the block of one whip being made fast to the fall of another.

A GUN TACKLE PURCHASE is made by a rope rove through two single blocks, and the end made fast to the fixed block.

A LUFF TACKLE PURCHASE is made by a rope rove through a single and double block, the end of the rope is fast to the single block, and the fall leads from the double block.

A LUFF UPON LUFF is a luff tackle fast to the fall of another luff tackle.

A WATCH TACKLE is a luff tackle with a hook on the single block, and tail on the double block, it has a short fall rove in it.

A RUNNER TACKLE is a luff fast to a whip.

A SINGLE BURTON is made by a rope rove through two single blocks in the following manner. Reeve one end of the rope through the upper, or fixed block, and make it fast to the strop of the lower moveable, or fly block; pass the bight of the rope through the eye of the hook and over the bend of the hook, then reeve the other end of the rope through the fly block.

SUMNER'S METHOD.

In the following Examination Paper, the question is proposed in the form given by the Board of Trade. The M.T.G. is given, and the declination and equation of time are corrected for the time from the nearest noon. Then with the first assumed latitude, 49° 30′ N the longitude is found exactly as in finding the longitude by chronometer.

The process is repeated with the same altitude and polar distance, and the second assumed latitude 49° 50′ N.

The candidate will understand the question better by carefully examining the solution than by any formal rules that can be given.

He will be supplied with a blank chart with the numbers denoting the degrees of latitude on it, but he must number the degrees of longitude himself.

NOTE.—See Arts. 98, 99, 100, and 222 Fifth Edition of Bergen's Navigation.

Exn. 6 *a.* *Port of*.....

Rotation No.

EXAMINATION PAPER

TO BE USED BY A CANDIDATE FOR A CERTIFICATE COMPETENCY AS A

Issued by the Board of Trade, in pursuance of 17 and 18 Vic., c. 104.

FIRST MATE.

To be used at the above Port this.....day of.....18.....

N.B.—A Candidate for a First Mate's Certificate of Competency will be required to work the Questions in Papers Exn. 4, Exn. 5, and Exn. 6, in addition to the Questions in this paper.

If at sea on April 24th, 1866 A.M. and uncertain of my position, when a Chronometer showed 23d. 20h. 29m. 38s. G.M.T. Suppose the observed altitude of the Sun's L.L. be 30° 25′ 00″, and again P.M. the same day, when the Chronometer showed 24d. 1h. 3m. 12s. G.M.T., the observed altitude of the Sun's L.L. be 52° 4′. The Ship have made 34 miles on a true W ¾ N course in the interval. Height of the eye 18 feet. Required the line of bearing when the first altitude was taken, and the position of the Ship by "Sumner's Method" when the second altitude was observed; assuming the latitudes 49° 30′ N and 49° 50′ N

Space for minor corrections.

Cosec.

77° 10′ 0″ | 0·010986
— 3
77 10 6 | 0·010983

diff..48
6
2,88

Cos.

78° 37′ 0″ | 9·295286
— 418
78 37 40 | 9·294868

diff...1046
40
418,40

Sin.

48° 2′ 0″ | 9·871301
+ 49
48 2 26 | 9·871350

diff...189
26
1134
378
49,14

Cos.

78° 47′ 0″ | 9·288964
— 425
78 47 40 | 9·288539

diff...1063
40
425,20

Sin.

48° 12′ 0″ | 9·872434
+ 49
48 12 26 | 9·872483

diff...188
26
1128
376
48,88

CALCULATION.

	d.	h.	m.	s.
M.T.G. April	23	20	29	38
April	24	0	0	0
		3	30	22

3·5

	DEC.	VAR	EQ. T. m. s.	VAR. s.
April 24th,	12° 52′ 47″ N	49″·35	—1 55·62	0·466
	— 2 53	3·5	—0 1·63	3·5
	12 49 54	24675	—1 53·99	2330
	90 0 0	14805	———	1398
P.D.	77 10 6	6,0)17,2·725		1·6310
		2 52·7		

With assumed Latitude 49° 30′.

Obs. alt.	30° 25′ 0″	Alt.....	30° 35′ 14″
Dip....	— 4 11	Lat.	49 30 0 sec. 0·187456
	30 20 49	P.D.....	77 10 6 cosec. 0·010983
Corr....	— 1 31		2)157 15 20
	30 19 18	Half-sum ...	78 37 40 cos. 9·294868
Sem ..	+ 15 56	Diff.....	48 2 26 sin. 9·871350
True alt	30 35 14		h. m. s.
		H.A.	20 9 53 log. 9·864657
		Eq. T.....	— 1 54 73
		M.T.S. April 23	20 7 59 8=1s.
		M.T.G. April 23	20 29 38
			0 21 39
			60 60
			4)21 99

Longitude 5 24¾ West.

With assumed Latitude 49° 50′

Alt.	30° 35′ 14″		
Lat.	49 50 0	sec.	0·190431
P.D.....	77 10 6	cosec.	0·010983
	2)157 35 20		
	78 47 40	cos..	9·288539
	48 12 26	sin..	9·872483
	h. m. s.		
H.A.	20 10 32	log..	9·362436
Eq. T. ...	— 1 54		
M.T.S.Apl. 23	20 8 38		
M.T.G.Apl. 23	20 29 38		
	0 21 0		
	60 60		
	4)21 60		

Longitude 5° 15′ West.

PROJECTION ON THE CHART.

Draw the assumed parallels of latitudes, and mark both positi found by the preceding calculation, on the Chart, call the position lower latitude, A, and that on the higher latitude, B. Draw a line through A and B; this line will be the *First Line of Beari* its direction by the Compass. It is N by E ¼ E.

Next, from any point P in the line AB, set off the true course interval, W ¾ N, and distance from P to a point C 84 miles.

Through C draw a line parallel to A B and mark it A′ B′; wh read A dash, B dash respectively.

Now suppose the ship's computed position at the time of taki second altitude to be as follows, where D and E correspond to th positions on the chart.

D.	E.
Latitude... 49° 30′N	Latitude... 49° 50′N
Longitude. 5 5 W	Longitude. 6 48½ W

Find the ship's position on the chart at the time of taking the altitude.

Proceed as follows. Mark the given positions D and E on the draw a line from D to E, this line will be the *Second Line of Be* mark the point where it intersects the line A′ B′ by the letter S .S is the ship's position at the time of taking the second altitude, a the chart, it is in Latitude 49° 43′ N, Longitude 6° 13′ W.

EXERCISES.

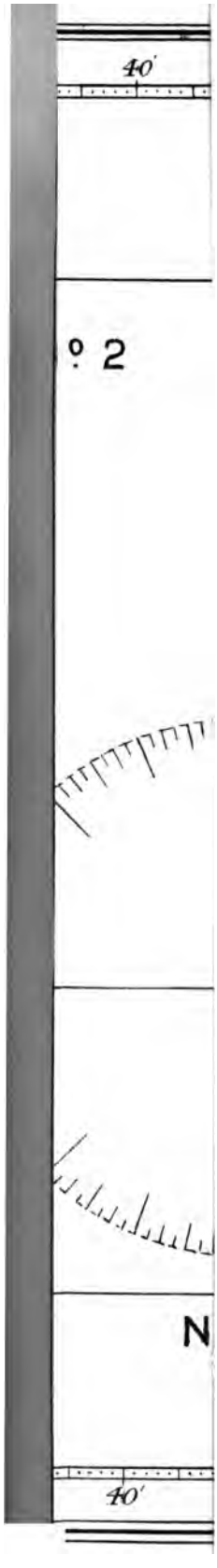
1. If at Sea on 7th February, 1860, A.M. at Ship, and uncerta my position, when a Chronometer shewed 6d. 21h. 22m. 45s. G. Suppose the observed altitude of the Sun's L.L. be 12° 18′ 50″, again P.M. the same day, when the Chronometer showed 7d. 2h. 9m. G.M.T., the observed altitude of the Sun's L.L. be 22° 49′. The have made 10 miles on a true East course in the interval. Heig the eye 17 feet. Required the line of bearing when the first alt was taken, and the position of the ship by "Sumner's Method" the second altitude was observed; assuming the latitudes 49° 20′ N 49° 40′ N.

Again, suppose the ship's computed positions at the time of takin second altitude to be as follows:

D.	E.
Latitude... 49° 20′N	Latitude... 49° 40′N
Longitude. 9 21½W	Longitude. 10 47½W.

Find the Ship's position on the chart at the time of taking the sec altitude?

2. If at Sea on March 15th, 1865, A.M., and uncertain of my positio when a Chronometer shewed 14d. 20h. 10m. 51s. G.M.T. Suppose t observed altitude of the Sun's L.L. be 14° 14′ 0″, and again P.M. t same day, when the Chronometer shewed 15d. 3h. 45m. 9s. G.M. the observed altitude of the Sun's L.L. be 23° 17′ 0′ The ship ha made 21 miles on a true course N by E ¼ E in the interval. Height the eye 16 feet. Required the line of bearing when the first altitude was taken, and the position of the Ship by "Sumner's Method" when the second altitude was observed; assuming the latitudes 49° 0′ N and 49° 40 N.


40'
º 2
N
40'

Again; suppose the Ship's calculated position at the time of taking the second altitude to be as follows:—

D.	E.
Latitude 49° 0′ N	Latitude 49° 40′ N
Longitude 4 17 W	Longitude 4 58½ W

Find the Ship's position on the chart at the time of taking the second altitude?

3. If at sea on April 6th, 1866, P.M. and uncertain of my position, when a chronometer shewed 6d. 1h. 17m, 25s. G.M.T. Suppose the observed altitude of the Sun's L.L. be 45° 7′ 10″, and again 10 P.M. the same day, when the Chronometer shewed 6d. 4h. 23m. 24s. G.M.T. the observed altitude of the Sun's L.L. be 24° 52′ 10″. The ship have made 46 miles on a true N.E. course in the interval. Height of the eye 18 feet. Required the line of bearing when the first altitude was taken, and the position of the ship by "Sumner's Method" when the second altitude was observed; assuming the latitude 50° 10′ N and 50° 30′ N.

Again; suppose the Ship's calculated positions at the time of taking the second altitude to be as follows:—

D.	E.
Latitude 50° 30′ N	Latitude 51° 0′ N
Longitude 7 17 W.	Longitude 7 36 W.

Find the Ship's position on the chart at the time of taking the second altitude?

NOTE.—In this question, the given course and distance sailed, takes the Ship to the Northward of the higher assumed latitude, it is therefore taken as the lower assumed latitude for the second line of bearing.

4. If at sea on June 17th, 1868, A.M., and uncertain of my position, when a Chronometer shewed 16d. 19h. 15m. 43s. G.M.T. Suppose the observed altitude of the Sun's L.L. be 21° 35′ 10″, and again P.M. the same day when the Chronometer shewed 17d. 2h. 28m. 1s. G.M.T., the observed altitude of the Sun's L.L. be 55° 54′. The Ship have made 40 miles in a true E. ¾ N. course in the interval. Height of the eye 22 feet. Required the line of bearing when the first altitude was taken, and the position of the Ship by "Sumner's Method" when the second altitude was observed; assuming the latitudes 50° 40′ N and 51° 28′ N.

Again; suppose the Ship's positions at the time of taking the second altitude to be as follows:—

D.	E.
Latitude 50° 40′ N	Latitude 51° 20′ N
Longitude 10 46 W.	Longitude 11 49¼ W.

Find the Ship's position on the chart at the time of taking the second altitude?

5. If at sea on January 12th, 1876, A.M., and uncertain of my position, when a Chronometer shewed 11d. 21h. 29m. 51s. G.M.T. Suppose the observed altitude of the Sun's L.L. be 6° 18′ 30″, and again P.M. the same day when the Chronometer shewed 12d. 3h. 55m. 30s. G.M.T. the observed altitude of the L.L. be 5° 39′ 0″. The Ship have made 32 miles on a true S.E. by E. ½ E. course in the interval. Height of the eye 21 feet. Required the line of bearing when the first

altitude was taken, and the position of the Ship by "Sumner's Method" when the second altitude was observed; assuming the latitudes 50° 0 N and 51° 0° N.

Again; suppose the Ship's position at the time of taking the second altitude to be as follows:—

D.	E.
Latitude 50° 0 N	Latitude 51° 0′ N
Longitude 6 33 W.	Longitude 8 6¼ W.

Find the Ship's position on the chart at the time of taking the second altitude?

6. If at sea on February 24th, 1876, A.M., and uncertain of my position, when a Chronometer shewed 23d. 21h. 14m. 46s. G.M.T. Suppose that the observed altitude of the Sun's L.L. be 15° 15′ 20″, and again P.M. the same day when the Chronometer shewed 24d. 2h. 35m. 17s. G.M.T. the observed altitude of the Sun's L.L. be 24° 48′ 0″. The ship have made 31 miles on a true N.E. ¼ E. course in the interval. Height of the eye 23 feet. Required the line of bearing when the first altitude was taken, and the position of the Ship by "Sumner's Method" when the second altitude was observed; assuming the latitudes 50° 0′ N and 50° 30′ N.

Again; suppose the Ship's positions at the time of taking the second altitude to be as follows:—

D.	E.
Latitude 50° 0′ N	Latitude 50° 30′ N
Longitude 5 43 W.	Longitude 6 56¼ W.

Find the Ship's position on the chart at the time of taking the second altitude?

7. If at sea on March 9th, 1876, A.M., and uncertain of my position, when a Chronometer shewed 8d. 21h. 35m. 2s. G.M.T. Suppose the observed altitude of the Sun's L.L. be 22° 27′ 30″, and again P.M. the same day when the Chronometer shewed 9d. 1h. 43m. 29s. G.M.T., the observed altitude of the Sun's L.L. be 32° 34′. The Ship have made 18 miles on a true W.N.W. course in the interval. Height of the eye 19 feet. Required the line of bearing when the first altitude was taken, and the position of the ship by "Sumner's Method" when the second altitude was observed; assuming the latitudes 51° 0′ N and 51° 30′ N.

Again; suppose the Ship's position at the time of taking the second altitude to be as follows:—

D.	E.
Latitude 51° 0′ N	Latitude 51° 30′ N
Longitude 5 32 W.	Longitude 7 45 ¼ W.

Find the Ship's position on the chart at the time of taking the second altitude?

8. If at sea on April, 1876, P.M., and uncertain of my position, when a Chronometer shewed 10d. 1h. 17m. 46s. G.M.T. Suppose the observed altitude of the Sun's L.L. be 45° 17′ 15″, and again P.M. the same day when the Chronometer shewed 10d. 5h. 9m. 14s. G.M.T., the observed altitude of the Sun's L.L. be 18° 17′. The Ship have made 12 miles on a true W. ¼ N. course in the interval. Height of the eye 27 feet. Required the line of bearing when the first altitude was taken, and the position of the ship by "Sumner's Method" when the second altitude was observed; assuming the latitude 51° 10′ N. and 51° 30′ N.

Again; suppose the Ship's positions at the time of taking the second altitude to be as follows:—

D.	E.
Latitude 51° 10′ N	Latitude 51° 30′ N.
Longitude 6 18 W.	Longitude 6 18¼ W.

Find the Ship's position on the chart at the time of taking the second altitude?

9. If at Sea, on May, 1876, A.M., and uncertain of my position, when a Chronometer showed 29d. 19h. 21m. 19s. G.M.T. Suppose the observed altitude of the Sun's L.L. be 28° 42′ 10″, and again P.M. the same day when the Chronometer showed 30d. 2h. 7m. 9s. G.M.T. the observed altitude of the Sun's L.L. be 56° 45′. The ship have made 67 miles on a true W. course in the interval. Height of the eye 15 feet. Required the line of bearing when the first altitude was taken, and the position of the Ship by "Sumner's Mefhod" when the second altitude was observed; assuming the latitudes 50° 0′ N. and 51° 0′ N.

Again; suppose the Ship's positions at the time of taking the second altitude to be as follows:

D.	E.
Latitude 50° 0 N.	Latitude 51° 0′ N.
Longitude 10 20 W.	Longitude 12 21¼ W.

Find the Ship's position on the chart at the time of taking the second altitude?

10. If at Sea on June 24th, 1876, A.M., and uncertain of my position, when a Chronometer showed 24d. 0h. 5m. 54s. G.M.T. Suppose the observed altitude of the Sun's L.L. be 60° 26′ 15″, and again P.M. the same day when the Chronometer shewed 24d. 7h. 19m. 36s. G.M.T. observed altitude of the Sun's L.L. be 12° 57′. The Ship have made 33 miles on a true E ¼ S. course in the interval. Height of the eye 20 feet. Required the line of bearing when the first altitude was taken, and the position of the Ship by "Sumner's Method" when the second altitude was observed; assuming the latitudes 51° 30′ N. and 51° 38′ N.

Again, suppose the Ship's positions at the time of taking the second altitude to be as follows:

D.	E.
Latitude 51° 30′ N.	Latitude 51° 38′ N.
Longitude 10 50¼ W.	Longitude 10 45 W.

Find the Ship's position on the chart at the time of taking the second altitude?

11. If at Sea on July 1876, P.M., at Ship, and uncertain of my position, when a Chronometer showed 5d. 1h. 3m. 59s. G.M.T. Suppose the observed altitude of the Sun's L.L. be 61° 16′ 10″, and again P.M. the same day when the Chronometer showed 5d. 6h. 17m. 9s. G.M.T., the observed altitude of the Sun's L.L. be 20° 20′. The Ship have made 18 miles on a true W. by N. ¼ N. course in the interval. Height of the eye 24 feet. Required the line of bearing when the first altitude was taken, and the position of the Ship by "Sumner's Method" when the second altitude was observed; assuming the latitudes 50° 40′ N. and 50° 52′ N.

Again; suppose the Ship's positions at the time of taking the second altitude be as follows:

D.	E.
Latitude 50° 40′ N.	Latitude 50° 52′ N.
Longitude 8 12 W.	Longitude 8 8 W.

Find the Ship's position on the chart on the time of taking the second altitude?

12. If at Sea on August, 1876, A.M. at Ship, and uncertain of my position, when a Chronometer shewed 16d. 8h. 0m. 20s. Suppose the observed altitude of the Sun's L.L. be 28° 14′ 10″, and again P.M. at Ship the same day when the Chronometer shewed 16d. 14h. 0m. 20s. G.M.T. the observed altitude of the Sun's L.L., be 46° 21′. The ship have made 30 miles on a true E. course in the interval. Height of the eye 12 feet. Required the line of bearing when the first altitude was taken, and the position of the Ship by "Sumner's Method" when the second altitude was observed; assuming the latitudes 50° 10′ N. and 50° 50′ N.

Again; suppose the Ship's positions at the time of taking the second altitude to be as follows:

D.		E.	
Latitude	50° 10′ N	Latitude	50° 50′ N
Longitude	179 16½ E.	Longitude	178 5 E.

Find the Ship's position on the chart at the time of taking the second altitude?

13. If at Sea on September 14th, 1876, A.M., and uncertain of my position, when a Chronometer shewed 13d. 19h. 4m. 57s. G.M.T. Suppose the observed altitude of the Sun's L.L. be 10° 25′ 10″, and again P.M. the same day when the Chronometer showed 14d. 3h. 6m. 50s. G.M.T. the observed altitude of the Sun's L.L., be 30° 24′. The Ship have made 32 miles on a true N.E by E. ½ E. course in the interval. Height of the eye 17 feet. Required the line of bearing when the first altitude was taken, and the position of the ship by "Sumner's Method" when the second altitude was observed; assuming the latitudes 49° 30 N. and 50° 0′ N.

Again; suppose the Ship's computed positions at the time of taking the second altitude be as follows:

D.		E.	
Latitude	49° 30′ N	Latitude	50° 0′ N
Longitude	3 58 W.	Longitude	4 32¾ W.

Find the Ship's position on the chart at the time of taking the second altitude?

14. If at Sea on October 20th, 1876, P.M., and uncertain of my position, when a Chronometer showed 20d. 0h. 30m. 54s. G.M.T. Suppose the observed altitude of the Sun's L.L. 29° 37′ 15″, and again P.M. the same day when the Chronometer showed 20d. 3h. 44m. 50s. G.M.T. the observed altitude of the Sun's L.L. be 12° 21′. The Ship have made 24 miles on a true N.N.E. ½ E. course in the interval. Height of the eye 20 feet. Required the line of bearing when the first altitude was taken, and the position of the Ship by "Sumner's Method" when the second altitude was observed; assuming the latitudes 49° 20′ N. and 49° 28′ N.

Again; suppose the Ship's calculated positions at the time of taking the second altitude to be as follows:

D.		E.	
Latitude	49° 20′ N	Latitude	49° 50′ N
Longitude	3 47 W.	Longitude	4 17½ W.

Find the Ship's position on the chart at the time of taking the second altitude?

15. If at sea on November 23rd, 1876, A.M., and uncertain of my position, when a Chronometer showed 22d. 20h. 17m. 28s. G.M.T. Suppose the observed altitude of the Sun's U.L. be 6° 14′ 40″, and again P.M. the same day, when the Chronometer shewed 23d. 1h. 46m. 40s. G.M.T., the observed altitude of the Sun's U.L. be 14° 58′ 20″. The Ship have made 5 miles on a true West course in the interval. Height of the eye 17 feet. Required the line of bearing when the first altitude was taken, and the position of the ship by "Sumner's Method" when the second altitude was observed; assuming the latitudes 49° 50′ N. and 50° 20′ N.

Again; suppose the Ship's calculated positions at the time of taking the second altitude to be as follows:—

D.	E.
Latitude 49° 50′ N	Latitude 50° 20′ N
Longitude 0 43½ E	Longitude 0 41 W.

Find the Ship's position on the chart at the time of taking the second altitude?

16. If at sea on December 5th, 1876, A.M., and uncertain of my position, when a Chronometer shewed 4d. 21h. 10m. 2s., G.M.T. Suppose the observed altitude of the Sun's U.L. be 9° 27′ 7″, and again P.M. the same day, when the Chronometer showed 5d. 2h. 5m. 59s. G.M.T., the observed altitude of the Sun's U.L. be 9° 39′ 0″. The Ship have made 21 miles on a true W.N.W. course in the interval. Height of the eye 19 feet. Required the line of bearing when the first altitude was taken, and the position of the Ship by "Sumner's Method" when the second altitude was observed; assuming the latitudes 51° 30′ N. and 52° 0′ N.

Again; suppose the Ship's positions at the time of taking second altitude be as follows.—

D.	E.
Latitude 51° 30′ N	Latitude 52° 0′ N
Longitude 3 16¼ E	Longitude 2 8¾ E.

Find the Ship's position on the chart at the time of taking the second altitude?

17. If at sea on January 14th, 1876, A.M. at Ship, and uncertain of my position, when a Chronometer showed, January 14th, 11h. 29m. 0s. G.M.T. Suppose the observed altitude of the Sun's L.L. be 18° 53′ 44″, and again the same day when the Chronometer showed January 14th, 13h. 12m. 0s. G.M.T., the observed altitude of the Sun's L.L. be 18° 6′ 51″. The Ship have made 8 miles on a true North course in the interval. Height of the eye 19 feet. Required the line of bearing when the first altitude was taken, and the position of the ship by "Sumner's Method" when the second altitude was observed; assuming the latitudes 48° 43′ N. and 49° 30′ N.

Again; suppose the Ship's positions at the time of taking the second altitude as follows:—

D.	E.
Latitude 48° 43′ N	Latitude 49° 30′ N
Longitude 178 5 W	Longitude 177 28¼ E.

Find the Ship's position on the chart at the time of taking the second altitude?

ANSWERS TO SUMNER'S METHOD.

No.	Pol. Dist.	Eq. T.	True Alt.	W. Longitudes at		First Line of Bearing	Ship's position on Chart.	
				Lower Latitude.	Higher Latitude.		Lat. N	Long. W.
		m. s.						
1	105° 29′ 4″	+ 14 23	12° 26′ 50″	5° 21½′	4° 53′	NE ½ E+	48° 41′	6° 33′
2	92 4 19	+ 9 5	14 22 33	5 35½	5 12	N by E ½ E+	49 48	5 7½
3	83 30 18	+ 2 27	45 18 8	7 22½	9 21½	W by N ½ N	50 52½	7 31
4	66 35 51	+ 0 36	21 44 1	12 33½	12 45½	N by W	51 12½	11 38
5	111 43 30	+ 8 23	6 22 18	9 0½	7 22½	NE+	50 23½	7 11
6	99 37 47	+ 13 31	15 23 28	6 55½	6 20	NE ½ N	50 15½	6 22
7	94 16 45	+ 10 37	22 37 10	6 15½	5 34½	NE ½ N	51 13½	6 34
8	81 47 47	+ 1 11	45 27 15	4 53½	6 25½	E by S ½ S	51 23½	6 17
9	68 9 25	— 2 42	23 52 6	9 26½	9 36	N ½ W	50 28½	11 19
10	66 34 55	+ 2 12	60 37 8	12 8½	11 34½	E by N ½ N	51 33	10 46
11	67 15 17	+ 4 21	61 26 39	7 14 E	8 32 E	W by N ½ N	50 48	8 9½
12	76 32 19	+ 3 54	28 24 56	179 22½ W	179 38 W	N by E ½ E	49 43½	179 58
13	86 44 6	— 4 38	10 32 7	4 58	4 52	N ½ E	49 44½	4 9½
14	100 34 55	— 15 14	29 47 25	4 46½	6 32½ E	E ½ S	49 39	4 7
15	110 27 55	— 13 19	5 45 59	0 13½ E	0 28½	NE ½ N+	50 5½	0 0
16	112 27 19	— 9 1	9 0 57	2 36½ E	3 47½ W	NE by E	51 48½	2 30 E
17	111 17 17	+ 9 22	19 3 5	177 11 15	175 15 30	E ½ N	49 3	180 0

ELEMENTS FROM THE NAUTICAL ALMANAC.

No.	Declination N or S	Difference for 1 hour. + or —	Equation of Time. + or —	Difference for 1 hour. + or —	Semi-Diameter.
	° ′ ″	″	m. s.	s.	′ ″
1	15 27 2 S	+ 46·93	+ 14 23·76	— 0.121	16 15
2	2 0 34 S	+ 59·18	+ 9 2·47	+ 0·720	16 6
3	6 28 28 N	+ 56·61	+ 2 28·04	— 0·727	16 1
4	23 24 27 N	— 3·80	+ 0 38·90	— 0·541	15 46
5	21 42 30 S	+ 24·19	+ 8 25·87	— 0·967	16 18
6	9 35 12 S	+ 55·32	+ 13 30·46	+ 0·367	16 12
7	4 14 24 S	+ 58·69	+ 10 35·09	+ 0·652	16 8
8	8 11 1 N	+ 55·19	+ 1 11·40	— 0·681	15 59
9	21 52 15 N	— 21·78	— 2 40·21	+ 0·348	15 48
10	23 25 5 N	+ 3·51	+ 2 11·70	— 0·535	15 46
11	22 44 59 N	— 14·64	+ 4 20·34	+ 0·422	15 46
12	13 34 3 N	— 47·75	+ 3 57·98	— 0·514	15 50
13	3 11 11 N	+ 57·76	— 4 41·96	— 0·878	15 57
14	10 34 28 S	+ 58·68	— 15 13·74	+ 0·402	16 7
15	20 29 49 S	— 30·69	— 13 16·21	+ 0·724	16 15
16	22 28 10 S	— 18·37	— 8 57·86	+ 1·054	16 17
17	21 22 19 S	— 26·28	+ 9 11·05	+ 0·915	16 18

PRACTICAL EXAMINATION IN THE USE

OF THE

BLANK CHART

FOR ALL GRADES WHERE THE CHART IS USED.

DEVIATION CARD No. 1.

SHIP'S HEAD WHEN BUILDING.

Ship's Head. Correct Magnetic.	Deviations.	Ship's Head by Compass.	Deviations.
North	2 East	North	2 East
N by E	6	N by E	10
NNE	10	NNE	16
NE by N	15	NE by N	22
NE	20	NE	24
NE by E	22	NE by E	25
ENE	24	ENE	24
E by N	25	E by N	22
East	25	East	20
E by S	23	E by S	16
ESE	19	ESE	15
SE by E	14	SE by E	9
SE	9	SE	6
SE by S	3	SE by S	2
SSE	3 West	SSE	2 West
S by E	4	S by E	3
South	6	South	5
S by W	7	S by W	6
SSW	9	SSW	7
SW by S	11	SW by S	9
SW	12	SW	10
SW by W	14	SW by W	12
WSW	17	WSW	14
W by S	19	W by S	15
West	20	West	18
W by N	21	W by N	20
WNW	20	WNW	21
NW by W	18	NW by W	21
NW	16	NW	20
NW by N	12	NW by N	17
NNW	8	NNW	12
N by W	4	N by W	6

The Examiner marks four positions, A, B, C and D, on the same chart that is used in "Sumner's Method," and requires the candidate to answer the questions that are given in the following form:—

No. 1.

Exn. 9 *b* 1. *Port of SUNDERLAND.*

Rotation No.
127

PRACTICAL EXAMINATION IN THE USE OF THE CHART.

FOR ALL GRADES WHERE THE CHART IS USED.

(*a.*)—Using Deviation Card No. 1, find the course to steer by compass from A to B, also the distance.

Answer.—Compass course..... SW ¼ W
Distance..... 45 miles
Variation ..... 25° W.

(*b.*)—With the ship's head on the above-named compass course C bore by compass W ¼ N, distant 14 miles; find the Lat. and Long. of the ship when it was on that bearing.

Answer.—Latitude..... 49° 24′ N
Longitude ..... 3 38 W.

(*c.*)—With the ship's head as above D bore by compass NE by E ¼ E also E bore SSE ¼ E by the same compass. Find the ship's position.

Answer.—Latitude..... 49° 8½′ N
Longitude ..... 3 52 W.

Signature, WILLIAM DIXON.

Date, 1880, *March 30th.*

SOLUTION OF THE PRECEDING QUESTIONS.

Lay an edge of a parallel ruler over the positions A and B, then move the ruler parallel to the line through them until an edge pass through the centre of the compass, the point of the compass coinciding with the edge of the ruler, shews the true course from A to B. Then proceed as follows:—

a.

True course from A to B, S by W=S 11° 15′ W.
Variation..... 25 0 W; allow to right hand.

Magnetic course ..... S 36 15 W=SW ¼ S.
Deviation from left side of card... 11 15 W; allow to right.

Compass course ..... S 47 30 W=SW ¼ W.

b.

Compass bearing of C, W ¼ N=N 84° 23′ W.
Deviation same as in *a* ..... 11 15 W; allow to left.

Magnetic bearing..... N 95 38 W.
Variation, same as in *a* ..... 25 0 W; allow to left.

True bearing, ... N 120 38 W.
or 180 0

True bearing ..... S 59 22 W.=SW by W ¼ W.

	c.	D.	E.
Compass bearings } bearings of }	NE by E ¼ E=N 59° 4′ E;	SSE ¼ E=S 30° 56′ E.	
Deviation same as *a*	11 15 W to left	11 15 W.	
Magnetic bearings	N 47 49 E	S 42 11 E.	
Variation same as in *a*	25 0 W to left	25 0 W.	
True bearings	N 22 49 E	S 67 11 E.	
or	NNE	ESE	

Note 1.—Questions *b* and *c* are given with the ship's head on the compass course, as it is found by Question *a*; hence the deviation as found by question *a* will not be altered, and therefore may be used in Questions *b* and *c*.

The candidate may, if he choose, use the deviation from the right side of the card, for Questions *b* and *c*, thus:—

b.

Compass bearing of C. W ¼ N=N 84° 23′ W.
Deviation for compass course, SW ¼ W, from right side of card ..... 10 30 W; allow to left.
Magnetic bearing ..... N 94 53 W.
Variation, same as in *a* ..... 25 0 W; allow to left.

True bearing,..... N 119 53 W.
or 180 0

True bearing ..... S 60 7 W=SW by W ¼ W.

Note. 2.—There is a slight differenee between the deviations, as found by the two methods, arising from the deviations in the Table being only given to the whole points and the nearest whole degree, but this difference is of no practical importance.

Note. 3.—Should the course be altered in Questions *b* and *c*, then their deviations must be taken out of the right side of the card, thus:—

Compass of bearing of C, W ½ N=N 84° 23′ W.
Course altered to ENE, deviation for this course..... 24 0 E; allow to right.

Magnetic bearing ..... N 60 23 W
Variation, same as in *a* ..... 25 0 W; allow to left.

True bearing ..... N 85 23 W=W ½ N.

NOTE. 4.—In all the following Questions, the course is not altered:—

No. 2.

(*a.*)—Using Deviation Card, No. 1, find the course to steer by compass from A to B, also the distance.

Answer.—Compass course..... N by E ½ E
Distance ..... 89 miles
Variation ..... 23° E.

(*b.*)—With the Ship's Head on the above-named Compass Course, C bore by compass SW by W, distant 8 miles; find the Lat. and Long. of the Ship when it was on that bearing.

Answer.—Latitude..... 50° 5′ N
Longitude ..... 4 41 ¾ W.

(*c.*)—With the Ship's Head as above, D bore by Compass SW; also E bore NW by the same Compass. Find the Ship's position.

Answer.—Latitude..... 49° 48′ ½ N
Longitude ..... 4 19 W.

SOLUTIONS OF THE PRECEDING QUESTIONS.

a

True course from A to B, NE by E=N 56° 15′ E
Variation ..... 23 0 E to left.

Magnetic course..... N 33 15 E=NE by N
Deviation from left side of card ... 15 0 E to left.

Compass course..... N 18 15 E=N by E ½ E.

b.

Compass bearing SW by W =S 56° 15′ W
Deviation same as in *a* 15 0 E; allow to right

Magnetic bearing ... S 71 15 W
Variation same as in *a* ... 23 0 E; allow to right

True bearing ... ... S 94 15 W
Or, 180 0

True bearing ... ... N 85 45 W = W ½ N.

c.

	D.	E.
Compass bearings, SW=S 45° 0′ W; NW=N 45° 0′ W		
Deviation same as in *a*	15 0 E, allow to right	... 15 0 E
Magnetic bearings, ...	S 60 0 W	N 30 0 W
Variation same as in *a*	23 0 E, allow to right	... 23 0 E
True bearings, ...	S 83 0 W	N 7 0 W
	= W ¼ S	= N ¼ W

No. 3.

(*a.*)—Using Deviation Card, No. 1, find the course to steer from A to B, also the distance.

Answer.—Compass course, ... SE ¼ E.
Distance, ... 39 miles.
Variation, ... 22° 30′ W

(*b.*)—With the Ship's Head on the above-named Compass course, C, bore by Compass W by N, distant 8 miles; find the Lat. and Long. of the Ship when the point was on that bearing.

Answer.—Latitude, ... 48° 54′ N.
Longitude, ... 4 45 W.

(*c.*)—With the Ship's Head as above, D, bore by Compass East; also E, bore South by the same Compass. Find the Ship's position.

Answer.—Latitude, ... 49° 0′ N.
Longitude, ... 4 12 W.

No. 4.

(*a.*)—Using Deviation Card, No. 1. Find the course to steer by compass from A to B, also the distance.

Answer.—Compass course, ... W ¼ N.
Distance, ... 84 miles.
Variation, ... 23° 15′ E.

(*b.*)—With the Ship's Head on the above-named Compass course, C, bore by Compass SW by S, Distant 5 miles; find the Lat. and Long. of the Ship when it was on that bearing.

Answer.—Latitude, ... 50° 0′ N.
Longitude, ... 5 52 W.

(*c.*)—With the Ship's Head as above, D, bore by Compass SSE; also E, bore ENE by the same Compass. Find the Ship's position.

Answer.—Latitude, ... 50° 4¼′ N.
Longitude, ... 5 27 W.

No. 5.

(*a.*)—Using Deviation Card, No. 1. Find the course to steer by compass from A to B, also the distance.

Answer.—Compass course, ... N by W ¼ W.
Distance, ... 42 miles.
Variation, ... 22° 30′ W.

(*b.*)—With the Ship's Head on the above-named Compass Course, C, bore by Compass S 14° W. Distant 6 miles; find the Lat. and Long. of the Ship when it was on that bearing.

Answer.—Latitude, ... 49° 10′ N.
Longitude, ... 5 43 W.

(*c.*)—With the Ship's Head as above, D, bore by Compass SSW, also E, bore by the same Compass WNW. Find the Ship's position.

Answer.—Latitude, ... 49° 16′ N.
Longitude, ... 5 17 W.

No. 6.

(*a.*)—Using Deviation Card, No. 1, find the course to steer by compass from A to B, also the distance.

Answer.—Compass course..... NE ¼ N
Distance ..... 20 miles
Variation ..... 19° 42′ E.

(*b.*)—With the Ship's Head on the above-named Compass Course, C bore by Compass NW by N, Distant 5 miles; find the Lat. and Long. of the Ship when it was on that bearing.

Answer.—Latitude..... 50° 2′ N
Longitude ..... 6 52 W.

(*c.*)—With the Ship's Head as above D bore by Compass NW by W; also E bore SW by S by the same Compass; find the Ship's position.

Answer.—Latitude..... 49° 56′ N
Longitude ..... 6 26 W.

No. 7.

(*a.*)—Using Deviation Card, No. 1. find the course to steer by compass from A to B, also the distance.

Answer.—Compass course..... NE ¼ N
Distance ..... 89 miles
Variation ..... 8° 30′ W

(*b.*)—With the Ship's Head on the above-named Compass Course, C bore by Compass NNW ¼ W, distant 7 miles; find the Lat. and Long. of the Ship when it was on that bearing.

Answer.—Latitude..... 49° 15′ N
Longitude ..... 6 43 W.

(*c.*)—With the Ship's Head as above D bore by Compass SW by S; also E bore NW by W by the same Compass. Find the Ship's position.

Answer.—Latitude..... 49° 5′ N
Longitude ..... 6 8 W

No. 8.

A Lat. 50° N, Long. 4° W; B Lat. 51° N, Long. 5° W; C Lat. 50° N, Long. 5° W; D Lat. 50° N, Long. 4° 50′ W; E Lat. 50° N, Long. 4° 20′ W.

(*a.*)—Using Deviation Card, No. 1, find the course to steer by compass from A to B, also the distance.

Answer—Compass course..... NNW ¼ W
Distance ..... 70¼ miles
Variation ..... 7° E

(*b.*)—With the Ship's Head on the above-named Compass Course, C bore by Compass SSW, distant 8¼ miles; find the Lat. and Long. of the Ship when it was on that bearing.

Answer.—Latitude. ..... 50° 8′ N
Longitude ..... 4 56 W.

(*c.*)—With the Ship's Head as above, D bore by Compass SW; also E bore SE by the same Compass. Find the ship's position.

Answer.—Latitude..... 50° 9′ N
Longitude ..... 4· 87 ½ W

No. 9.

A Lat. 50° N, Long. 6° W; B Lat. 51° N, Long. 5° W; C Lat. 50° N, Long. 5 W; D Lat. 50° N, Long. 5° 40′ W; E Lat. 50° N, Long. 5° 20′ W.

(*a.*)—Using Deviation Card, No. 1. Find the course by Compass from A to B, also the Distance.

Answer.—Compass course..... NNE
Distance ..... 70¼ miles
Variation ..... 10° W.

(*b.*)—With the Ship' Head on the above-named Compass Course, C bore by compass SSE, Distant 5 miles; find the Lat. and Long. of the Ship when it was on that bearing.

Answer.—Latitude..... 50° 5′ N
Longitude ..... 5 2¼ W.

(*c.*)—With the Ship's Head as above, D bore by Compass SW; also E bore SE by the same compass. Find the ship's position.

Answer.—Latitude..... 50° 6· N
Longitude ..... 5 27 W

No. 10.

A. Lat. 50° N, Long. 6° 40′ W. B. Lat. 51° N, Long. 5° W. C. Lat· 51° N, Long. 7° W. D. Lat. 50° 10′ N, Long. 6° W. E. Lat. 50° 20′N, Long. 6° W.

(*a.*)—Using Deviation Card, No. 1.; find the course to steer by compass from A to B, also the distance.

Answer.—Compass course, ... N ¼ W.
Distance, ... 65 miles.
Variation, ... 33° 40′ E.

(*b.*)—With the Ship's Head on the above-named Compass Course, C, bore by Compass NW by W; distant 9 miles; find the Lat. and Long. of the Ship when it was on that bearing.

Answer.—Latitude ... ... 50° 52′ N.
Longitude ... ... 6 53¼ W.

(*c.*)—With the Ship's head as above, D, bore by Compass SE by E; also E, bore NE by N, by the same Compass. Find the Ship's position.

Answer.—Latitude ... ... 50° 18½′ N.
Longitude ... ... 6 6 W.

No. 11.

A. Lat. 50° 20′N, Long. 8° W. B. Lat. 51° N, Long. 7°W. C. Lat. 51° N, Long. 8° W. D. Lat. 50° N, Long. 8° W. E. Lat. 50° N, Long. 7° W.

(*a.*)—Using Deviation Card, No. 1, find the course to steer by compass from A to B; also the distance.

Answer.—Compass course ... ... NE ¾ N.
Distance ... ... 55½ miles.
Variation ... ... 17° W.

(*b.*)—With the Ship's Head on the above-named Compass course, C, bore by Compass NW by N; Distant 9 miles; find the Latitude and Longitude of the ship when it was on that bearing.

Answer.—Latitude ... ... 50° 52′ N.
Longitude ... ... 7 53 W.

(*c.*)—With the Ship's Head as above, D, bore by Compass SSW, also E, bore ESE by the same Compass; find the Ship's position.

Answer.—Latitude ... ... 50° 16′ N.
Longitude ... ... 7 46 W.

No. 12.

A. Lat. 49° W, Long. 8° W. B. Lat. 49° 40′ N, Long. 7° W. C. Lat. 49° N, Long. 7° W. D. Lat. 49° 20′ N, Long. 8° W. E. Lat. 49° 40′ N, Long. 8° W.

(*a.*)—Using Deviation Card, No. 1, find the course to steer by Compass from A to B.

Answer.—Compass course ... ... N by E +.
Distance ... ... 55½ miles.
Variation ... ... 21° 30′ E.

(*b.*)—With the Ship's Head on the above-named Compass course, C, bore by Compass ESE, distant 10 miles; find the Latitude and Longitude of the Ship when it was on that bearing.

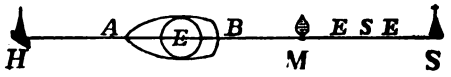
Answer.—Latitude ... ... 49° 8′ N.
Longitude ... ... 7 9 W.

(*c.*)—With the Ship's Head as above, D, bore by Compass SW by S; also E, bore NW by W by the same Compass. Find the Ship's position.

Answer.—Latitude ... ... 49° 23½′ N.
Longitude ... ... 7 47½ W.

ON PLACING MARKS IN LINE FOR THE USE OF IRON SHIPS.

Suppose a steamer be off Filey, bound to Hamburg; now the magnetic course by chart from Filey to Helgoland, is about ESE. In the



annexed figure let S be the spire of a church at Filey, H the island of Helgoland, SH a straight line between S and H, and therefore bearing ESE from S, M a conspicuous mark, such as a beacon, or pole, on the line SH, and on the shore at Filey, AB a ship with the marks M and S in line right astern, then the ship's head must be pointing exactly towards Helgoland.

Suppose the course by the ship's compass be E, then by steering E by her own compass she will really go ESE by the chart to Helgoland.

And just as leading lights *right ahead* guide ships safely *into* the Tyne, or other ports, so would leading marks *right astern* guide ships safely *from* the Tyne, or other ports, to ports across the sea, or in any required direction.

ON THE METHODS OF ADJUSTING IRON SHIPS' COMPASSES AT THE NORTH-EASTERN PORTS.

A few years ago the author was in the business of adjusting iron ship's compases at North Shields, and he inserted an article or two in the *Shields Daily News*, containing his experience in that business, and pointing out the difficulty that adjusters have for want of a proper place and proper facilities for performing their highly important operation. Those articles caused a little talk about the matter, but it was only talk, nothing was done. The author therefore ventures again to mention the subject. Ships in the north-eastern ports have their compasses adjusted either in dock, or at sea. The dock is not suitable from the action of the iron of other iron ships, or masses of iron about the dock, on the compass. Ships are therefore generally taken to sea for the purpose of adjustment.

In fine clear weather, with the sun shining and the sea smooth, the operation can be fairly performed, but in cloudy weather with a strong sea on, it is very difficult and sometimes impossible to do it. The adjuster should have the power of revolving the ship on a pivot, as it were, so that her head may be placed on every point of the compass, and kept on it while he is making his observations, and at the same time the ship should be kept stationary with his marks in line, and he should have the power of preventing the rolling and pitching of the ship, which causes the compass to vibrate considerably. Now it is impossible to fulfil these conditions at sea, and therefore it is impossible for the adjuster to adjust the compass properly; he does the best he can under the circumstances, and bad is the best very often.

The author, therefore, again proposes that a place, say on Jarrow Slake, should be dredged out, a dolphin with no iron in its construction put down, the ship whose compass wants adjusting hung by the middle to this dolphin, and small buoys, or posts, put down at a little distance from the dolphin, for to make warps fast to for warping the ship round; and he ventures to say, if this were done, adjusters would be able to adjust iron ships' compasses correctly, and thus do a very important part towards the safety of life and property.

EXPLANATION OF THE GREAT CIRCLE CHART OF THE SOUTH PACIFIC OCEAN.

In Article 134 of Bergen's Navigation the author treats of Combin Charts, and gives such Charts on a very small scale. The accompan ing Chart is, in the Author's opinion, on a scale large enough for the of navigators; for by laying a straight edge on it, over Sydney a Valparaiso, it is seen at a glance that the shortest possible route fro Sydney is by going south of New Zealand, and from Stewart Island Valparaiso, the Great Circle will go as far South as 60° S; but if th be thought too far South, then the track may be modified by Towson's Method of Composite Sailing, see Article 122.

Suppose it be determined to go no further south than 50° S, then th distance by this track is 6151 miles, while the distance by the Mercat track is 6853 miles: thus making a difference, in this instance, of 70 miles in favour of Great Circle sailing. The brushes and arrows show that this track leads through a region of favourable winds and currents; while, by the Chart, the Mercator track leads through a region of variable currents, and, at the edge of the belt, of light winds and calms.

The Great Circle can be transferred to a Mercator Chart by Article 128, Bergen's Navigation.

By a Great Circle Chart of the Central Pacific published by the Author, it appears that the shortest possible road from Bass Strait to Panama leads South of Stewart Island, New Zealand, and that the Great Circle to Panama crosses the parallel of 20° S, in about the meridian of 105° W; this point is transferred to the Great Circle Chart of the South Pacific.

The distance between Babel Island, Bass Strait, and Panama, is 257 miles shorter by the Great Circle than by Mercator. The Great Circle leads through a region of favourable winds and currents for about two-thirds of the distance; but by crossing the parallel of 30° S in about 100° W, the ship will lengthen her voyage about 85 miles, but she will have fair winds nearly all the way. By the Mercator track the ship will have fair winds for about one-third of the distance, and then she will have the SE trades, and also a current against her for the remainder of the voyage.

Windward Great Circle Sailing.

Two sailing Ships are in lat. 34° 0′ S, long. 154° 0′ E, bound to Valparaiso in lat. 33° 2′ S, long. 71° 42′ W; the wind is from the East, that is, nearly right ahead by the Mercator track. One of the captains is ignorant of Great Circle Sailing, so that to him it appears to be a matter of indifference on which track the ship be put, as far as the wind is concerned. He puts her on the starboard tack, and after sailing 180 miles she is 64 miles farther from her port than when she started. The other captain understands Great Circle Sailing, and puts his ship on the port tack, and after sailing 180 miles she is 125 miles nearer to her port than when she started: thus, in this instance, making a difference in one day's sail of 189 miles in favour of Great Circle Sailing.—See the South Pacific Great Circle Chart.

N.E
TO

APPENDIX.

NOTICE.

By an Order in Council, dated 24th March, 1880, Article 10 of the "Regulations for Preventing Collisions at Sea," which was to come into force on the 1st of September, 1880, is suspended until the 1st of September, 1881, and in lieu thereof the following Article, being No. 9 of the previous Regulations shall remain in force until the 1st of September, 1881.

"Art. 9. Open fishing boats and other open boats shall not be required to carry the side lights required for other vessels; but shall, if they do not carry such lights, carry a lantern having a green slide on the one side and a red slide on the other side; and on the approach of or to other vessels, such lantern shall be exhibited in sufficient time to prevent collision, so that the green light shall not be seen on the port side, nor the red light on the starboard side.

Fishing vessels and open boats when at anchor, or attached to their nets and stationary, shall exhibit a bright white light.

Fishing vessels and open boats shall, however, not be prevented from using a flare-up in addition, if considered expedient."

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SUNDERLAND,

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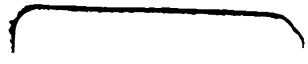
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